STORMWATER MANAGEMENT PLAN

210, 256 & 276 QUAKER ROAD

CITY OF WELLAND

Prepared For:

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REFERENCES

1. Stormwater Management Planning and Design Manual
    Ontario Ministry of Environment (March 2003)

2. Soils of the Regional Municipality of Niagara Soil Survey Report No. 60 of the Ontario
    Institute of Pedology. (1989)

3. Northwest Welland Stormwater Management Implementation Plan
    Upper Canada Consultants (October 2022)

STORMWATER MANAGEMENT PLAN

210, 256 & 276 Quaker Road

CITY OF WELLAND

1.0   INTRODUCTION

1.1   Study Area

Upper Canada Consultants (UCC) has been retained by landowner of the 210, 256, & 276 Quaker Road properties to prepare a stormwater management plan to address the stormwater management needs for the proposed subdivision development located within the aforementioned properties.

The proposed subdivision is located in the north-eastern portion of the Northwest Welland Secondary Plan (NWWSP) area in the City of Welland, north of Quaker Road, west of Niagara Street, east of First Avenue, and south of the municipal boundary with the City of Thorold.

UCC has previously prepared a Stormwater Management Implementation Plan for the entirety of the NWWSP Area. This Plan identified the preferred locations of future stormwater management (SWM) Facilities within the developable areas in the Secondary Plan in support of the realignment of the Towpath Drain, which flows through the proposed subdivision lands, and identified the existing stormwater flows through each segment of the existing watercourse.

It was identified in the Implementation Plan that two SWM Facilities are to be constructed in the eastern limit of the proposed subdivision lands to provide stormwater management quality and quantity controls the entire 'Block' of development area, bound by Quaker Road on the south, First Avenue on the west, to the eastern limit of 210 Quaker Road, and south of the municipal boundary with the City of Thorold as shown in Figure 1 as Block 1. Therefore, this Block (Block 1) will hereafter be referred to as 'subject lands' in this report.
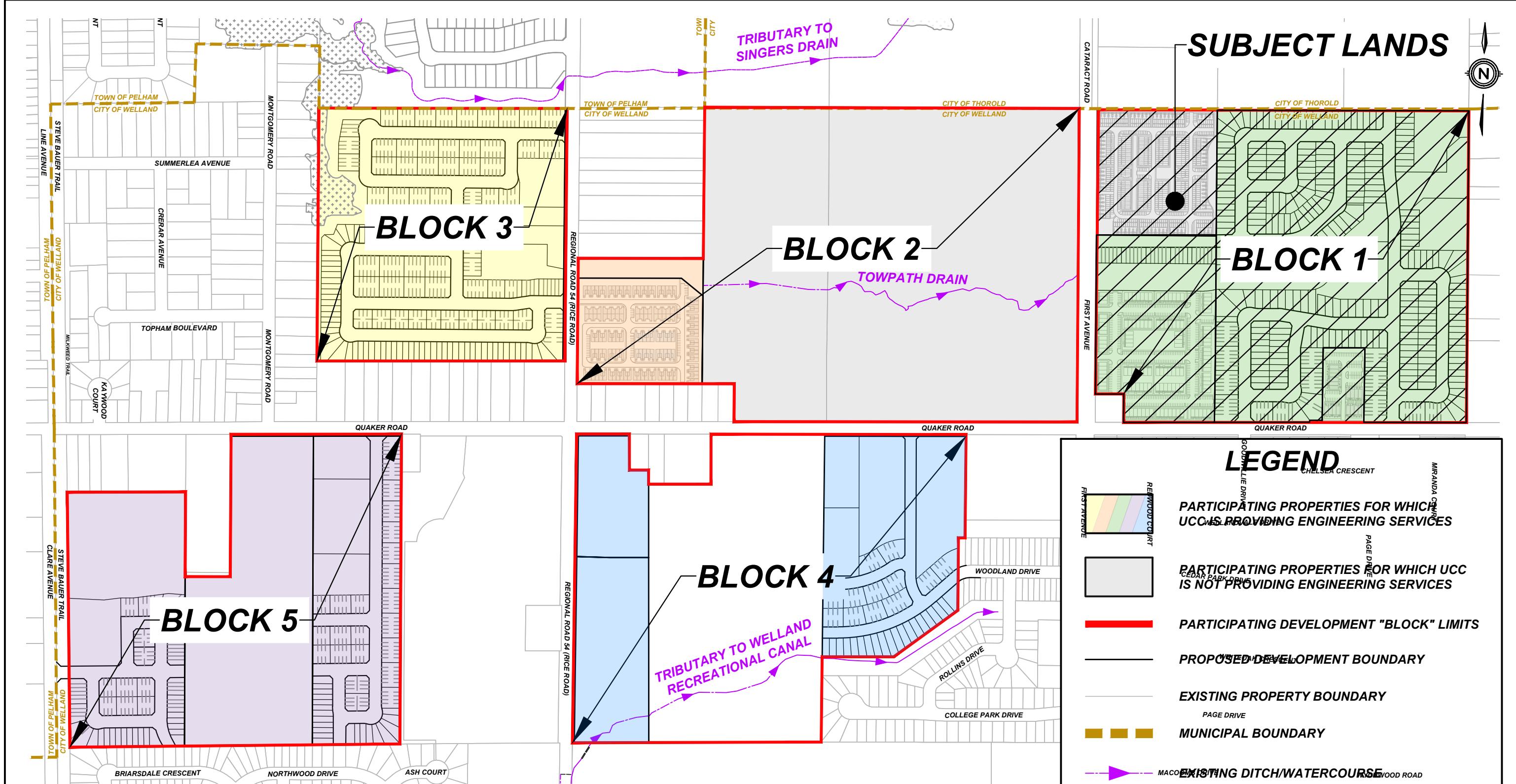
The subject lands are approximately 28.99 hectares and will consist of a mix of subdivision and condominium developments, comprising of an overall mix of residential single detached, street townhouse, stacked townhouse, and apartment dwellings. The subject lands will be developed to include associated asphalt roadways, concrete curb, catch basins, storm sewers, sanitary sewers, and watermain.

1.2 Objectives

The objectives of this study are as follows:

1. Establish specific criteria for the management of stormwater from this site.

2. Determine the impact of development on the stormwater peak flow & volume of stormwater from the drainage area.

3. Investigate alternatives for controlling the quality of stormwater discharging from the site.

4. Establish the property requirements to construct stormwater management facilities for the Draft Plan of Subdivision.

SUBJECT LANDS

BLOCK 3

BLOCK 2

BLOCK 1

BLOCK 4

BLOCK 5

TRIBUTARY TO SINGERS DRAIN

TOWPATH DRAIN

TRIBUTARY TO WELLAND RECREATIONAL CANAL

LEGEND

PARTICIPATING PROPERTIES FOR WHICH UCC IS PROVIDING ENGINEERING SERVICES

PARTICIPATING PROPERTIES FOR WHICH UCC IS NOT PROVIDING ENGINEERING SERVICES

PARTICIPATING DEVELOPMENT "BLOCK" LIMITS

PROPOSED DEVELOPMENT BOUNDARY

EXISTING PROPERTY BOUNDARY

MUNICIPAL BOUNDARY

EXISTING DITCH/WATERCOURSE

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

NORTHWEST WELLAND SECONDARY PLAN
CITY OF WELLAND
SITE LOCATION PLAN - BLOCK 1

DATE	2024-07-16
SCALE	1:6000 m
REF No.	-
DWG No.	FIGURE 1

1.3   Existing & Proposed Conditions

a) Existing Conditions

The topography of the subject lands is relatively flat with a general slope towards the Towpath Drain, which flows through the middle of the site from west to east direction. The Towpath Drain conveys stormwater flows through the City of Welland and the City of Thorold, prior to ultimately outletting into the Welland Canal, with multiple crossings at Municipal and Regional roads, and Highway 406.

Existing stormwater flows and the delineation of existing stormwater drainage areas for the Towpath Drain were assessed as part of the Implementation Plan to the culvert crossing at Regional Road 50 (Niagara Street) and will be the basis for future peak flow targets for all stormwater management facilities constructed within the Secondary Plan Area.

As part of the realignment of the Towpath Drain, twin 2.4 x 1.8m concrete box culverts will be constructed crossing Regional Road 50 (Niagara Street), a 1.8 x 1.2m concrete box culvert will be constructed crossing Regional Road 54 (Rice Road), and the existing 1800mm diameter culvert crossing First Avenue will remain. Upgrades to the First Avenue Culvert will be subject to a future NPCA Work Permit.

b) Proposed Conditions

The subject lands are approximately 28.99 hectares and will consist of a mix of subdivision and condominium developments, comprising of an overall mix of residential single detached, street townhouse, stacked townhouse, and apartment dwellings.

The subject lands will include associated asphalt roadways, concrete curb, catch basins, storm sewers, sanitary sewers, and watermain.

It is proposed to convey all future Stormwater flows from the subject lands to the Towpath Drain as identified in the Implementation Plan.

UCC has been retained as the engineering consultant for the majority of the developing landowners in the NWWSP, as shown in Figure 1. For the purpose of maintaining consistency between the various Draft Plan of Subdivision submissions within the Secondary Plan Area, the "Proposed Conditions" stormwater modelling will include the future SWM Facilities designed for each respective Block in the NWWSP.

For lands where Planning Act Applications are not expected to be submitted in the near future as of the writing of this stormwater management plan, where UCC has not been retained as the engineering consultant, or a stormwater management alternative has not yet been selected, future stormwater flows have been allocated to the Towpath Drain at the existing levels identified in the Implementation Plan.

The existing conditions MIDUSS modelling output file provided in the Implementation Plan has been included in Appendix A for reference.

2.0 STORMWATER MANAGEMENT CRITERIA

New developments are required to provide stormwater management in accordance with provincial and municipal policies including:

- Stormwater Quality Guidelines for New Development (MECP/MNRF, May 1991)

- Stormwater Management Planning and Design Manual (MECP, March 2003)

Based on the comments and outstanding policies from the City of Welland, Regional Municipality of Niagara, Niagara Peninsula Conservation Authority (NPCA), and the Ministry of the Environment, Conservation and Parks (MECP), the following site-specific considerations were identified:

- Per City of Welland requirements, stormwater **quality** improvements must be provided to a minimum of Enhanced Protection (80% TSS Removal).

- Per the Northwest Welland Stormwater Management Implementation Plan prepared by Upper Canada Consultants, future stormwater management facilities within the Secondary Plan Area will be required to provide **quantity** controls up to and including the 100 year design storm event before outletting to the Towapth Drain.

- **Erosion control** to be provided in accordance with MECP guidelines. The guidelines require an extended detention volume to be detained for 24 hours.

Based on above policies and site specific considerations, the following stormwater management criteria have been established for this site:

- Stormwater **quality** controls are to be provided for the more frequent storm events to provide Enhanced Protection (80% TSS Removal), prior to discharging to the receiving watercourse (Towpath Drain).

- To maintain existing water surface elevations in the Towpath Drain, stormwater **quantity controls** will be provided up to and including the 100 year design storm event.

- **Erosion protection** will be provided in accordance with MECP guidelines. The quidelines require an extended detention volume to be detained for 24 hours.

3.0 STORMWATER ANALYSIS

Stormwater for the existing and proposed conditions was estimated using the MIDUSS computer modelling program. This program was selected because it is applicable to both urban and rural drainage areas like the study area. It is relatively easy to use and modify for the future drainage conditions and control facilities. It readily allows for design storm hyetographs for the various return periods being investigated.

3.1 Design Storms
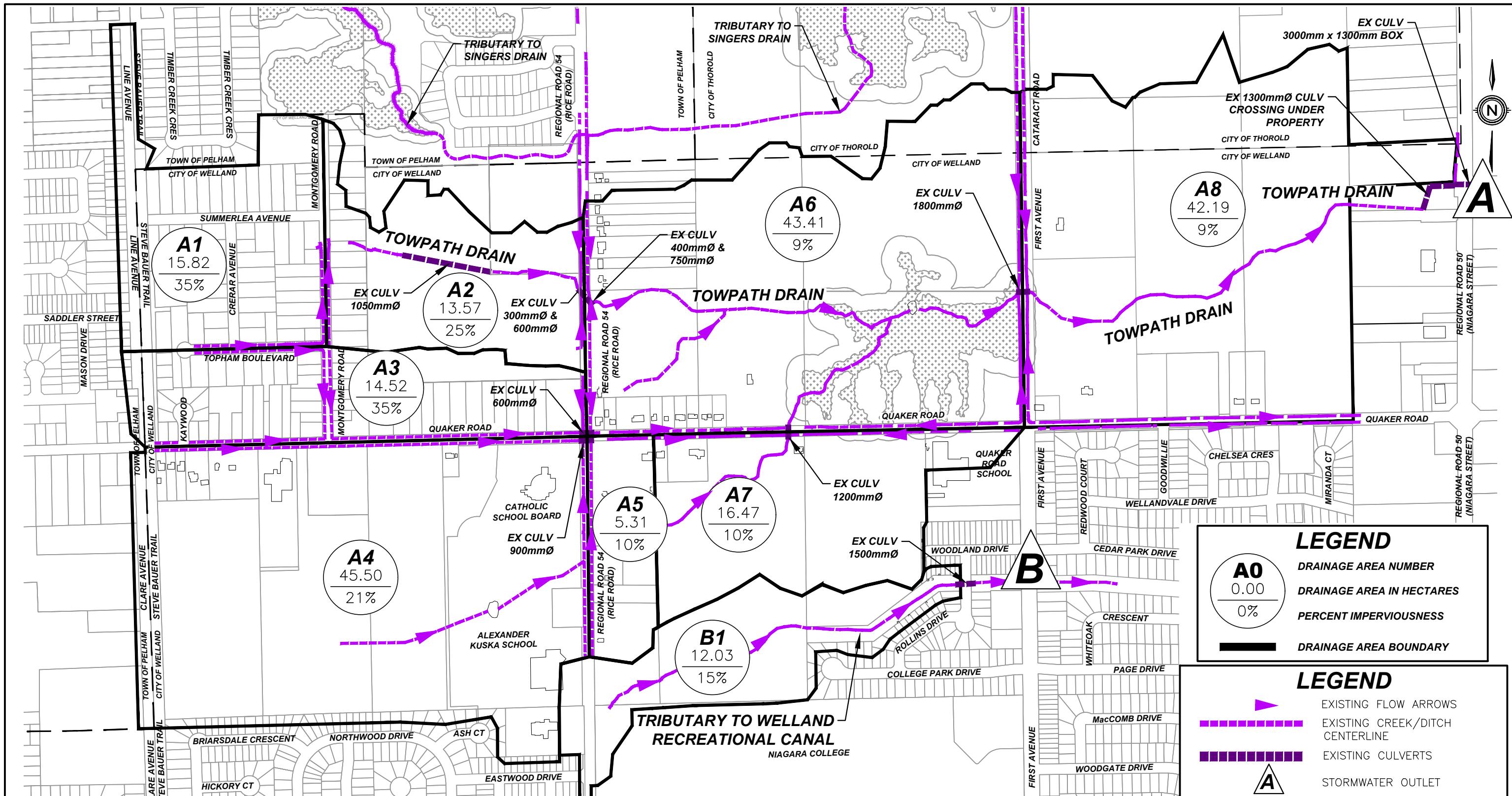
Design storm hyetographs for the storm system design uses a Chicago distribution based on the City of Welland Intensity-Duration-Frequency (IDF) curves. Hyetographs for the 25mm, 2, 5, 10, 25 and 100 year events were developed using a 4 hour Chicago distribution. The 25mm design storm event parameters were derived using the IDF curve and a 4-hour Chicago distribution. Table 1 summarizes the rainfall data applied in the stormwater modelling.

Table 1. Rainfall Data				
Design Storm (Return Period)	**Chicago Distribution Parameters** $i = \dfrac{a}{(t + b)^c}$			**Duration (minutes)**
	a	**b**	**c**	
25mm	512	6.0	0.800	240
2 Year	755	8.0	0.789	240
5 Year	830	7.3	0.777	240
10 Year	860	6.5	0.763	240
25 Year	900	5.2	0.745	240
100 Year	1020	4.7	0.731	240

3.2 Existing Conditions

Existing conditions within the Towpath Drain were assessed as part of the Implementation Plan to determine the existing the peak flows within the watercourse at existing and future roadway crossings. The existing catchment areas as provided in Figure 2 of the Implementation Plan have been included as Figure 2 in this stormwater management plan for reference.

For consistency between the stormwater management plans submitted by UCC in the NWWSP, Outlets A through D have been identified at specific locations along the Towpath Drain to demonstrate that the existing flows identified in the Implementation Plan are maintained at all locations within the watercourse under future conditions. The locations of Outlets A through D can be found on Figure 3 and the summary of the existing flows at each Outlet have been summarized in Table 2 below.

NORTHWEST WELLAND STORMWATER MANAGEMENT IMPLEMENTATION PLAN

CITY OF WELLAND

EXISTING STORM DRAINAGE AREA PLAN

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

DATE	2022-10-12
SCALE	1:7000
REF No.	21243
DWG No.	FIGURE 2

LEGEND

A0 / 0.00 / 0%	DRAINAGE AREA NUMBER / DRAINAGE AREA IN HECTARES / PERCENT IMPERVIOUSNESS
▬	DRAINAGE AREA BOUNDARY

LEGEND

EXISTING FLOW ARROWS
EXISTING CREEK/DITCH CENTERLINE
EXISTING CULVERTS
A — STORMWATER OUTLET

Table 2. Existing Peak Stormwater Flows – Towpath Drain					
Location	**Peak Flow (m³/s)**				
	2 Year	**5 Year**	**10 Year**	**25 Year**	**100 Year**
Outlet A1	1.317	1.589	1.800	2.099	2.558
Outlet A2	3.301	4.194	4.777	5.619	6.987
Outlet B (*)	3.425	4.367	4.977	5.863	7.305
Outlet C	4.035	5.176	5.914	7.005	8.781
Outlet D	4.509	5.835	6.678	7.938	9.995

Note (*) : Outlet B was not specified as a location where peak flows were evaluated within the Implementation Plan.

Therefore, the change in existing peak flow across the 803m width of Drainage Area A6 (between Rice Road and First Avenue) was prorated to the location of Outlet B (at 205m east of Rice Road) for the peak flow at Outlet B for each design storm event.

3.3   Proposed Conditions

For the purpose of maintaining consistency between the various Draft Plan of Subdivision submissions within the NWWSP Area, the "Proposed Conditions" stormwater modelling will include the future SWM Facilities designed for each respective Block in the NWWSP.

For lands where Planning Act Applications are not expected to be submitted in the near future, as of the writing of this stormwater management plan, or where UCC has not been retained as the engineering consultant, future stormwater flows have been allocated to the Towpath Drain at the existing levels identified in the Implementation Plan.

The future stormwater drainage areas for the NWWSP Area are shown in Figure 3, and a schematic of the future hydrologic modelling is provided as Figure 4.

As shown in Figure 3, there is an existing drainage area (A30) which is entirely within the City of Thorold and conveys existing stormwater flows through the subject lands to the Towpath Drain. For the purposes of this SWM Plan, this area will be included within the proposed SWM Facility at existing conditions. Should a Planning Act Application be submitted within this area, a separate SWM Facility on the adjacent property is to be constructed with a new outlet to the Towpath Drain.

Table 3 below provides a summary of the catchment areas shown in Figure 3 and associated hydrological parameters used for the MIDUSS software model.

The future conditions MIDUSS modelling output file has been enclosed in Appendix D for reference.
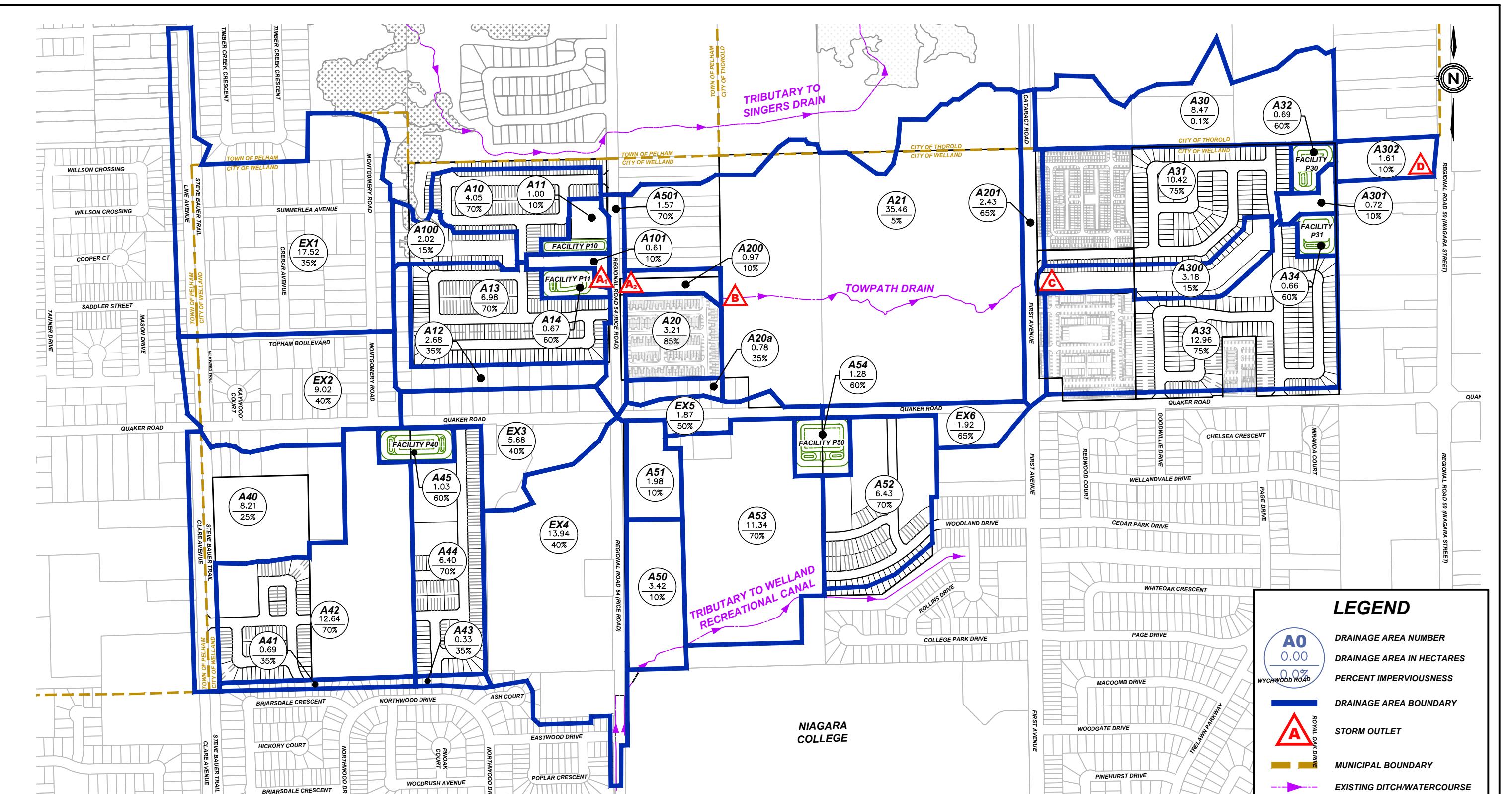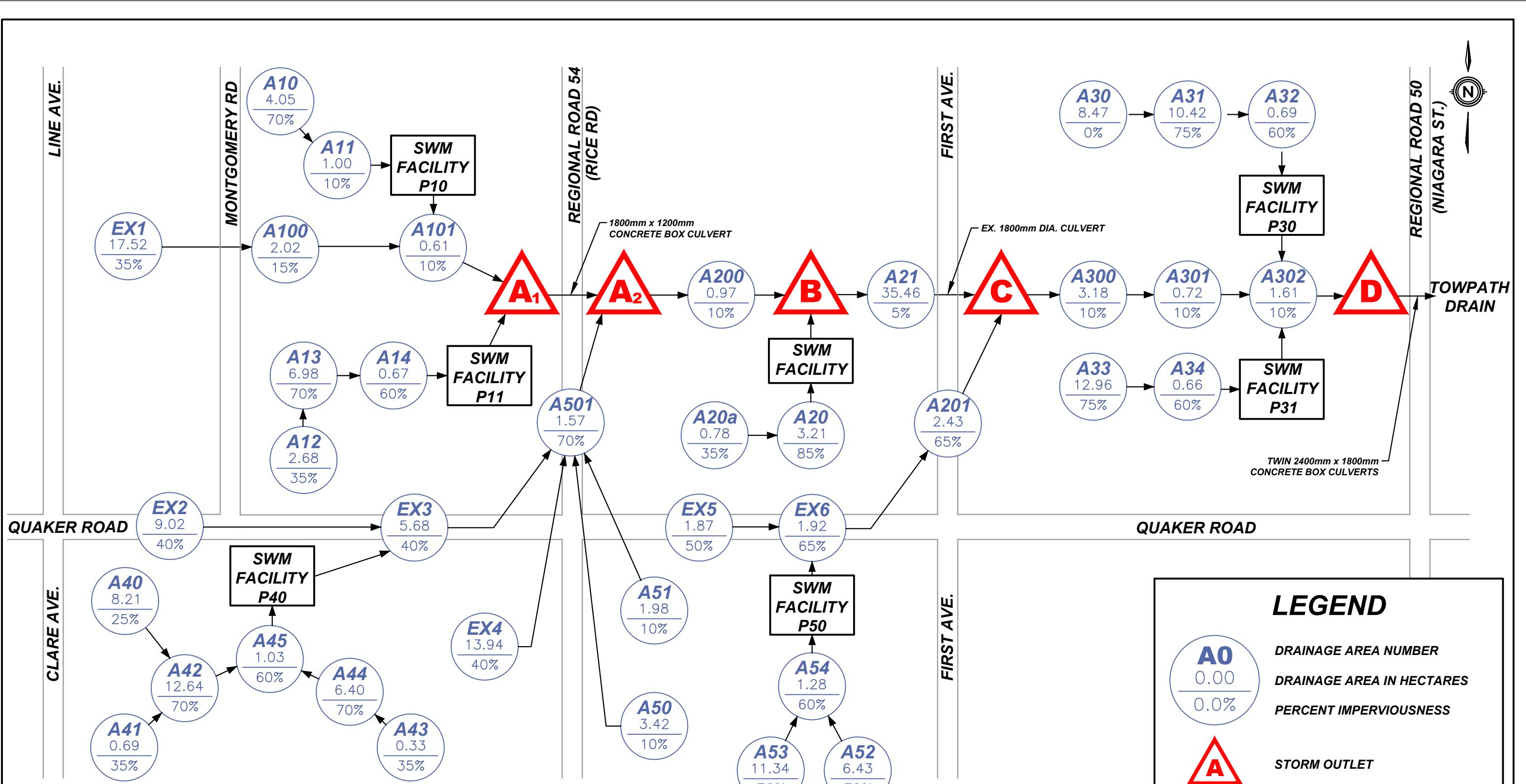
Table 3. Hydrologic Parameters for Future Conditions							
Area No.	Area (ha)	Length (m)	Slope (%)	Manning – "n" Perv.	Imperv.	Soil Type	SCS CN	Percent Impervious
EX1	17.52	343	1.0	0.25	0.015	CD	74	35%
A100	2.02	116	0.4	0.25	0.015	CD	74	15%
A10	4.05	164	1.0	0.25	0.015	CD	74	70%
A11	1.00	82	1.0	0.25	0.015	CD	74	10%
A101	0.61	64	1.0	0.25	0.015	CD	74	10%
A12	2.68	134	1.0	0.25	0.015	CD	74	35%
A13	6.98	216	1.0	0.25	0.015	CD	74	70%
A14	0.67	67	1.0	0.25	0.015	CD	74	60%
A40	8.21	234	1.0	0.25	0.015	CD	74	25%
A41	0.69	68	1.0	0.25	0.015	CD	74	35%
A42	12.64	290	1.0	0.25	0.015	CD	74	70%
A43	0.33	47	1.0	0.25	0.015	CD	74	35%
A44	6.40	207	1.0	0.25	0.015	CD	74	70%
A45	1.03	83	1.0	0.25	0.015	CD	74	60%
EX2	9.02	245	1.0	0.25	0.015	CD	74	40%
EX3	5.68	195	1.0	0.25	0.015	CD	74	40%
EX4	13.94	305	1.0	0.25	0.015	CD	74	40%
A50	3.42	151	1.0	0.25	0.015	CD	74	10%
A51	1.98	115	1.0	0.25	0.015	CD	74	10%
A501	1.57	102	1.0	0.25	0.015	CD	74	70%
A20a	0.78	72	1.0	0.25	0.015	CD	74	35%
A20	3.21	146	1.0	0.25	0.015	CD	74	85%
A200	0.97	80	1.0	0.25	0.015	CD	74	10%
A21	35.46	487	0.2	0.25	0.015	CD	74	5%
A52	6.43	207	1.0	0.25	0.015	CD	74	70%
A53	11.34	275	1.0	0.25	0.015	CD	74	70%
A54	1.28	92	1.0	0.25	0.015	CD	74	60%
EX5	1.87	112	1.0	0.25	0.015	CD	74	50%
EX6	1.92	113	0.2	0.25	0.015	CD	74	65%

A201	2.43	127	1.0	0.25	0.015	CD	74	65%
A300	3.18	146	0.2	0.25	0.015	CD	74	15%
A301	0.72	69	0.2	0.25	0.015	CD	74	10%
A30	8.47	238	0.2	0.25	0.015	CD	74	0.1%
A31	10.42	264	1.0	0.25	0.015	CD	74	75%
A32	0.69	68	1.0	0.25	0.015	CD	74	60%
A33	12.99	294	1.0	0.25	0.015	CD	74	75%
A34	0.66	66	1.0	0.25	0.015	CD	74	60%
A302	1.61	104	0.2	0.25	0.015	CD	74	10%
	204.87	**Total Area (ha)**						

NORTHWEST WELLAND SECONDARY PLAN
CITY OF WELLAND
FUTURE STORM DRAINAGE AREAS

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

DATE: 2024-10-17
SCALE: 1:7500 m
REF No.: -
DWG No.: FIGURE 3

LEGEND

Symbol	Description
A0 / 0.00 / 0.0%	DRAINAGE AREA NUMBER / DRAINAGE AREA IN HECTARES / PERCENT IMPERVIOUSNESS
▬	DRAINAGE AREA BOUNDARY
△ A	STORM OUTLET
▬ ▬	MUNICIPAL BOUNDARY
➤ ‑ ‑	EXISTING DITCH/WATERCOURSE

NORTHWEST WELLAND SECONDARY PLAN

CITY OF WELLAND

FUTURE HYDROLOGICAL MODELLING SCHEMATIC

LINE AVE.
MONTGOMERY RD
REGIONAL ROAD 54 (RICE RD)
FIRST AVE.
REGIONAL ROAD 50 (NIAGARA ST.)
QUAKER ROAD
CLARE AVE.
FIRST AVE.

TOWPATH DRAIN

1800mm x 1200mm CONCRETE BOX CULVERT

EX. 1800mm DIA. CULVERT

TWIN 2400mm x 1800mm CONCRETE BOX CULVERTS

LEGEND

A0 — DRAINAGE AREA NUMBER
0.00 — DRAINAGE AREA IN HECTARES
0.0% — PERCENT IMPERVIOUSNESS

A — STORM OUTLET

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

DATE	2024-07-16
SCALE	N.T.S.
REF No.	-
DWG No.	FIGURE 4

Drainage areas:
A10 4.05 70% | A11 1.00 10% | SWM FACILITY P10 | A101 0.61 10%
EX1 17.52 35% | A100 2.02 15%
A13 6.98 70% | A14 0.67 60% | SWM FACILITY P11
A12 2.68 35%
A501 1.57 70%
A200 0.97 10% | A21 35.46 5%
A20a 0.78 35% | A20 3.21 85% | SWM FACILITY
A201 2.43 65%
A30 8.47 0% | A31 10.42 75% | A32 0.69 60% | SWM FACILITY P30
A300 3.18 10% | A301 0.72 10% | A302 1.61 10%
A33 12.96 75% | A34 0.66 60% | SWM FACILITY P31
EX2 9.02 40% | EX3 5.68 40%
EX5 1.87 50% | EX6 1.92 65%
A40 8.21 25% | SWM FACILITY P40
A45 1.03 60% | A44 6.40 70%
A42 12.64 70% | A43 0.33 35%
A41 0.69 35%
EX4 13.94 40%
A51 1.98 10%
A50 3.42 10%
SWM FACILITY P50
A54 1.28 60%
A53 11.34 70% | A52 6.43 70%

4.0   STORMWATER MANAGEMENT ALTERNATIVES

4.1   Screening of Stormwater Management Alternatives

A variety of stormwater management alternatives are available to control the quantity and quality of stormwater, most of which are described in the Stormwater Management Planning and Design Manual (MECP, March 2003). Alternatives for the proposed and ultimate developments were considered in the following broad categories: lot level, vegetative, infiltration, and end-of-pipe controls. General comments on each category are provided below. Individual alternatives for the proposed development are listed in Table 4 with comments on their effectiveness and applicability to the proposed outlet.

a) Lot Level Controls

Lot level controls are not generally suitable as the primary control facility for quality control. They are generally used to enhance stormwater quality in conjunction with other types of control facilities.

b) Vegetative Alternatives

Vegetative stormwater management practices are not generally suitable as the primary control facility for quality control. They are generally used to enhance stormwater quality in conjunction with other types of control facilities.

c) Infiltration Alternatives

Where soils are suitable, infiltration techniques can be very effective in providing quantity and quality control. However, the very small amount of surface area on this site dedicated to permeable surfaces such as greenspace and landscaping make this an impractical option. Therefore, infiltration techniques will not be considered for this development.

d) End-of-Pipe Alternatives

Surface storage techniques can be very effective in providing quality and quantity control. Wet facilities are effective practices for stormwater erosion, quality and quantity control for large drainage areas (>5 ha).

Table 4.   Evaluation of Stormwater Management Practices

210, 256 & 276 Quaker Road *Site Conditions*	Criteria for Implementation of Stormwater Management Practices (SWMP)					Technical Effectiveness (10 high)	Recommend Implementation Yes / No	Comments
	Topography *Flat ±1%*	**Soils** *Variable ±15 mm/hr*	**Bedrock** *Shallow*	**Groundwater** *At Considerable Depth*	**Area** *± 28.99ha*			
Lot Level Controls								
Lot Grading	<5%	nlc	nlc	nlc	nlc	2	Yes	Quality/quantity benefits
Roof Leaders to Surface	nlc	nlc	nlc	nlc	nlc	2	Yes	Quality/quantity benefits
Roof Ldrs.to Soakaway Pits	nlc	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	< 0.5 ha	6	Yes	Quality/quantity benefits
Sump Pump Fdtn. Drains	nlc	nlc	nlc	nlc	nlc	2	No	Unsuitable site conditions
Vegetative								
Grassed Swales	< 5 %	nlc	nlc	nlc	nlc	7	Yes	Quality/quantity benefits
Filter Strips(Veg. Buffer)	< 10 %	nlc	nlc	>.5m Below Bottom	< 2 ha	5	No	Unsuitable site conditions
Infiltration								
Infiltration Basins	nlc	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	< 5 ha	2	No	Unsuitable site conditions
Infiltration Trench	nlc	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	< 2 ha	4	No	Unsuitable site conditions
Rear Yard Infiltration	< 2.0 %	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	< 0.5 ha	7	No	Unsuitable site conditions
Perforated Pipes	nlc	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	nlc	4	No	Unsuitable site conditions
Pervious Catch basins	nlc	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	nlc	3	No	Unsuitable site conditions
Sand Filters	nlc	nlc	nlc	>.5m Below Bottom	< 5 ha	5	No	High maintenance/poor aesthetics
Surface Storage								
Dry Ponds	nlc	nlc	nlc	nlc	> 5 ha	7	No	No quality control
Wet Ponds	nlc	nlc	nlc	nlc	> 5 ha	9	Yes	Very effective quality/quantity control
Wetlands	nlc	nlc	nlc	nlc	> 5 ha	6	No	Very effective quality control
Other								
Oil/Grit Separator	nlc	nlc	nlc	nlc	<2 ha	3	No	Limited benefit/area too large

Reference: Stormwater Management Practices Planning and Design Manual - 2003

nlc - No Limiting Criteria

4.2   Selection of Stormwater Management Alternatives

Stormwater management alternatives were screened based on technical effectiveness, physical suitability for this site, and their ability to meet the stormwater management criteria established for proposed and future development areas. The following stormwater management alternatives are recommended for implementation on the proposed development:

•   **Lot grading** to be kept as flat as practical in order to slow down stormwater and encourage infiltration.

•   **Roof leaders to be discharged to the ground surface** in order to slow down stormwater and encourage infiltration.

•   **Grassed swales** to be used to collect rear lot drainage. Grassed swales tend to filter sediments and slow down the rate of stormwater.

•   Two **wet pond facilities** on either side of the Towpath Drain are to be constructed to provide stormwater quality and quantity controls.

5.0   STORMWATER MANAGEMENT PLAN

A MIDUSS model was created to assess existing and future flows generated by the proposed subdivision. The stormwater management facility was sized according to MECP Guidelines (MECP, March 2003) as follows:

5.1   Northern Stormwater Management Facility 'P30'

5.1.1   Stormwater Quality Control

The stormwater drainage outlet for the proposed Wet Pond 'P30' is the Towpath Drain, where *Enhanced* protection will be provided. Based on Table 3.2 of SWMP & Design Manual, the Enhanced water quality storage requirement for wet pond facilities in a development with 75% impervious area is approximately 233 m^3/ha. The wet pond facility will provide stormwater quality controls for a drainage area of approximately 10.42 hectares (Area 31) as shown in Table 5.

Table 5. SWM Facility 'P30' - Stormwater Quality Volume Calculations	
Total Water Quality Volume = 10.42 ha x 233 m^3/ha = 2,428 m^3	Reference: Table 3.2, SWMP & Design Manual (MECP 2003)
Permanent Pool Volume = 10.42 ha x 193 m^3/ha = 2,011 m^3	**Extended Detention Volume** = 10.42 ha x 40 m^3/ha = 417 m^3

5.1.2   Erosion Control

Using the MIDUSS hydrological model, the stormwater volume from the 25mm - 4 hour design storm event for the overall 19.58 hectare drainage area (Areas A30. A31, and A32) to the proposed facility is 1,924 m^3.

The following table shows the stormwater storage volumes required using both the water quality and erosion control guidelines.

Table 6. SWM Facility 'P30' – Stormwater Quality Volume Requirements	
A. Permanent Pool Volume	2,011 m^3
B. Extended Detention Volume	417 m^3
C. Stormwater Volume from 25mm – 4-hour rainfall event	1,924 m^3
D. Minimum Extended Detention Volume (greater of B & C)	1,924 m^3
Total Quality and Extended Detention Volume (A + D)	**3,935 m^3**

5.1.3   Stormwater Management Facility 'P30' Configuration

As shown in Figure 5, it is proposed to construct a three-stage control outlet for the proposed stormwater management facility. The first stage of control consists of a reverse slope pipe acting as a tubular control orifice to detain the extended detention volume and release it slowly over an extended period of time. The second stage of control consists of a ditch inlet catch basin and outlet pipe which provides an outlet for flows exceeding the extended detention volume. The third stage consists of an emergency spillway to provide an outlet for greater storm events.

The proposed bottom elevation of the facility is 177.20 m, and the permanent pool water level is proposed at 178.80 m, for a permanent water depth of 1.6 metre. The configuration of the facility provides 2,221 m^3 of permanent pool volume, which is more than the required 2,011 m^3. The proposed top of pond is at an elevation of 180.80 m which provides a total active volume of 8,137 m^3 with 5:1 side slopes.

Based on the configuration of the proposed facility, it was determined that a 135 mm diameter (5 inch) quality orifice at an invert of 178.80 m can provide 29 hours of extended detention for the 25mm design storm event, which has a corresponding water surface elevation of 179.28m within the proposed facility.

The proposed ditch inlet catchbasin will be constructed with the rim at an elevation of 180.10 m which will provide an extended detention volume of 4,649 m^3, which is greater than the minimum volume of 1,924 m^3 specified in Table 6.

The outflow pipe from the stormwater management facility is to be 450mm in diameter and will convey the stormwater flows from the ditch inlet to the proposed headwall structure outletting to Towpath Drain. A stage-storage-discharge relationship was determined for the facility and is included in Appendix B for reference purposes.

Major overland flows within the northern portion of the subject lands directed to the proposed wetpond facility, and then to the Towpath Drain.

A sediment forebay has been sized for this facility to minimize the transport of heavy sediment throughout the facility and to localize maintenance activities. Calculations for the forebay sizing follow MECP Guidelines and is shown in Table 7.

Table 7. Stormwater Management Facility 'P30' Forebay Sizing

a) Forebay Settling Length (MOE SWMP&D, Equation 4.5)

$$Settling\ Length = \sqrt{\left(\frac{r \times Q}{V_s}\right)}$$

r =	3.5 :1	(Length:Width Ratio)
Q_p =	0.025 m³/s	(25mm Storm Pond Discharge)
V_s =	0.0003 m/s	(Settling Velocity)

Settling Length = **17.08** m

b) Dispersion Length (MOE SWMP&D, Equation 4.6)

$$Dispersion\ Length = \frac{8 \times Q}{D \times V_f}$$

Q =	1.401 m³/s	(5 Yr Stm Sew Design Inflow)
D =	1.50 m	(Depth of Perm. Pool in the Forebay)
V_f =	0.5 m/s	(Desired Velocity)

Dispersion Length = **14.94** m

c) Minimum Forebay Deep Zone Bottom Width (MOE SWMP&D), Equation 4.7)

$$Width = \frac{Min.\ Forebay\ Length}{8}$$

17.08 m   (minimum required length)

Width = **2.13** m   (minimum required width)

d) Average Velocity of Flow

$$Average\ Velocity = \frac{Q}{A}$$

Q =	0.760 m³/s	(25mm Storm Design Inflow)
A =	15.75 m²	(Cross Sectional Area)
D =	1.50 m	(Depth of Forebay)
W =	6.00 m	(Proposed Bottom Width)
SS =	3 :1	(Side Slopes - Minimum)

Average Velocity = **0.05** m/s
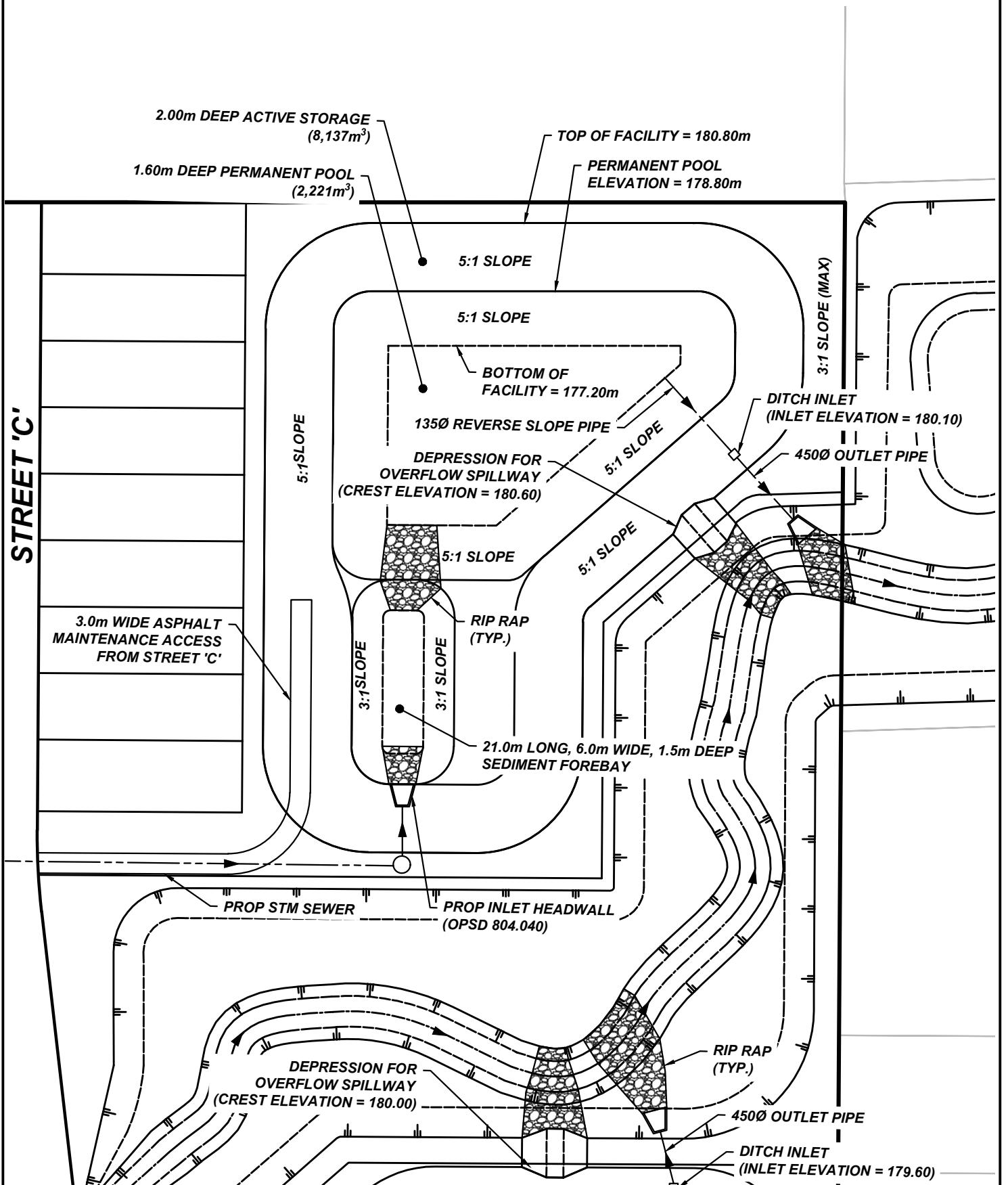
Is this Acceptable? **Yes**   (Maximum velocity of flow = 0.15 m/s)

e) Cleanout Frequency

Is this Acceptable? **Yes**

L =	21.0 m	(Proposed Bottom Length)
ASL =	3.13 m³/ha	(Annual Sediment Loading)
A =	10.42 ha	(Drainage Area)
FRC =	80 %	(Facility Removal Efficiency)
FV =	432.0 m³	(Forebay Volume)

Cleanout Frequency = **10.6** Years

Is this Acceptable? **Yes**   (10 Year Minimum Cleanout Frequency)

STREET 'C'

2.00m DEEP ACTIVE STORAGE
(8,137m³)

TOP OF FACILITY = 180.80m

1.60m DEEP PERMANENT POOL
(2,221m³)

PERMANENT POOL
ELEVATION = 178.80m

5:1 SLOPE

5:1 SLOPE

3:1 SLOPE (MAX)

5:1 SLOPE

BOTTOM OF
FACILITY = 177.20m

DITCH INLET
(INLET ELEVATION = 180.10)

135Ø REVERSE SLOPE PIPE

450Ø OUTLET PIPE

5:1 SLOPE

DEPRESSION FOR
OVERFLOW SPILLWAY
(CREST ELEVATION = 180.60)

5:1 SLOPE

5:1 SLOPE

3.0m WIDE ASPHALT
MAINTENANCE ACCESS
FROM STREET 'C'

3:1 SLOPE

3:1 SLOPE

RIP RAP
(TYP.)

21.0m LONG, 6.0m WIDE, 1.5m DEEP
SEDIMENT FOREBAY

PROP STM SEWER

PROP INLET HEADWALL
(OPSD 804.040)

RIP RAP
(TYP.)

DEPRESSION FOR
OVERFLOW SPILLWAY
(CREST ELEVATION = 180.00)

450Ø OUTLET PIPE

DITCH INLET
(INLET ELEVATION = 179.60)

UPPER CANADA
CONSULTANTS
ENGINEERS / PLANNERS

210, 256 & 276 QUAKER ROAD
CITY OF WELLAND
STORMWATER MANAGEMENT POND P30

DATE	2024−07−18
SCALE	1:750 m
REF No.	*1601*
DWG No.	*FIGURE 5*

Table 8 summarizes the peak inflows and outflows for the stormwater management facility along with corresponding pond elevations. Based on the MIDUSS model, the maximum wet pond elevation is 180.38 m, and an active storage volume is 5,999 m^3 for the 100-year design storm event.

Table 8. Stormwater Management Wet Pond Facility 'P30' Characteristics				
Design Storm	**Peak Flows (L/s)**		**Maximum Elevation (m)**	**Maximum Storage (m3)**
	Inflow	**Outflow**		
25mm	760	25	179.28	1,460
2 Year	1,210	34	179.64	2,856
5 Year	1,401	38	179.85	3,675
10 Year	1,576	42	180.03	4,365
25 Year	1,840	114	180.19	5,104
100 Year	2,246	250	180.38	5,999

Table 9. SWM Facility 'P30' – MECP Quality Requirements Comparison		
SWM Facility Characteristic	**MECP Requirement**	**Provided by SWM Facility**
Permanent Pool Volume (m^3) - *minimum*	2,011 (min)	2,221
Extended Detention Volume (m^3) – *minimum*	1,924 (min)	4,649
Total Quality + Detention Storage (m^3) – *minimum*	3,935 min)	6,870
Drawdown Time (hr) – *minimum*	24 (min)	29
Forebay Length (m) – *minimum*	17.08 (min)	21.00
Forebay Width (m) – *minimum*	2.13 (min)	6.00
Average Forebay Velocity (m/s) – *maximum*	0.15 (max)	0.05
Cleanout Frequency (years) - *minimum*	10 (min)	11

As shown in Table 9, the proposed stormwater management facility configuration satisfies the quality control requirements for the associated drainage area.

5.2 Southern Stormwater Management Facility 'P31'

5.2.1 Stormwater Quality Control

The stormwater drainage outlet for the proposed Wet Pond 'P31' is the Towpath Drain, where *Enhanced* protection will be provided. Based on Table 3.2 of SWMP & Design Manual, the Enhanced water quality storage requirement for wet pond facilities in a development with 75% impervious area is approximately 233 m^3/ha. The wet pond facility will provide stormwater quality controls for a drainage area of approximately 12.96 hectares (Area A33) as shown in Table 10.

Table 10. SWM Facility 'P31' - Stormwater Quality Volume Calculations	
Total Water Quality Volume = 12.96 ha x 233 m^3/ha = 3,020 m^3	Reference: Table 3.2, SWMP & Design Manual (MECP 2003)
Permanent Pool Volume = 12.96 ha x 193 m^3/ha = 2,501 m^3	**Extended Detention Volume** = 12.96 ha x 40 m^3/ha = 518m^3

5.1.2 Erosion Control

Using the MIDUSS hydrological model, the stormwater volume from the 25mm - 4 hour design storm event for the overall 13.62 hectare area (Areas A33 and A34) is 2,114 m^3.

The following table shows the stormwater storage volumes required using both the water quality and erosion control guidelines.

Table 11. SWM Facility 'P31' – Stormwater Quality Volume Requirements	
A. Permanent Pool Volume (m^3)	2,501 m^3
B. Extended Detention Volume (m^3)	518 m^3
C. Stormwater Volume from 25mm – 4-hour rainfall event	2,114 m^3
D. Minimum Extended Detention Volume (greater of B & C)	2,114 m^3
Total Quality and Extended Detention Volume (A + D)	**4,615 m^3**

5.1.3   Stormwater Management Facility 'P31' Configuration

As shown in Figure 6, it is proposed to construct a three-stage control outlet for the proposed stormwater management facility. The first stage of control consists of a reverse slope pipe acting as a tubular control orifice to detain the extended detention volume and release it slowly over an extended period of time. The second stage of control consists of a ditch inlet catch basin and outlet pipe which provides an outlet for flows exceeding the extended detention volume. The third stage will consist of an emergency spillway to provide an outlet for greater storm events.

The proposed bottom elevation of the facility is 176.50 m, and the permanent pool water level is proposed at 178.30 m, for a permanent water depth of 1.80 metres. The configuration of the facility provides 2,733 m^3 of permanent pool volume, which is more than the required 2,501 m^3. The proposed top of pond is at an elevation of 180.30 m which provides a total active volume of 8,059 m^3 with 5:1 side slopes.

Based on the configuration of the proposed facility, it was determined that a 150 mm diameter quality orifice at an invert of 178.30 m can provide 26 hours of extended detention for the 25mm design storm event, which has a corresponding water surface elevation of 178.84m within the proposed facility.

The proposed ditch inlet catchbasin will be constructed with the rim at an elevation of 179.60 m which will provide an extended detention volume of 4,692 m^3, which is greater than the minimum volume of 2,114 m^3 specified in Table 11.

The outflow pipe from the stormwater management facility is to be 450mm in diameter and will convey the stormwater flows from the ditch inlet to the proposed headwall structure outletting to Towpath Drain. A stage-storage-discharge relationship was determined for the facility and is included in Appendix C for reference purposes.

Major overland flows within the southern portion of the subject lands directed to the proposed wetpond facility, and then to the Towpath Drain.

A sediment forebay was included in this stormwater management facility to minimize the transport of heavy sediment from the storm sewer outlet throughout the facility and to localize maintenance activities. Calculations for the forebay sizing follow MECP Guidelines and is shown in Table 12.

Table 12. Stormwater Management Facility 'P31' Forebay Sizing

a) Forebay Settling Length (MOE SWMP&D, Equation 4.5)

$$Settling\ Length = \sqrt{\left(\frac{r \times Q}{V_s}\right)}$$

r =	8.0 :1	(Length:Width Ratio)
Q_p =	0.032 m³/s	(25mm Storm Pond Discharge)
V_s =	0.0003 m/s	(Settling Velocity)

Settling Length = **29.30** m

b) Dispersion Length (MOE SWMP&D, Equation 4.6)

$$Dispersion\ Length = \frac{8 \times Q}{D \times V_f}$$

Q =	1.765 m³/s	(5 Yr Stm Sew Design Inflow)
D =	1.50 m	(Depth of Perm. Pool in the Forebay)
V_f =	0.5 m/s	(Desired Velocity)

Dispersion Length = **18.83** m

c) Minimum Forebay Deep Zone Bottom Width (MOE SWMP&D), Equation 4.7)

$$Width = \frac{Min.\ Forebay\ Length}{8}$$

29.30 m   (minimum required length)

Width = **3.66** m   (minimum required width)

d) Average Velocity of Flow

$$Average\ Velocity = \frac{Q}{A}$$

Q =	0.922 m³/s	(25mm Storm Design Inflow)
A =	12.90 m²	(Cross Sectional Area)
D =	1.50 m	(Depth of Forebay)
W =	4.10 m	(Proposed Bottom Width)
SS =	3 :1	(Side Slopes - Minimum)

Average Velocity = **0.07** m/s
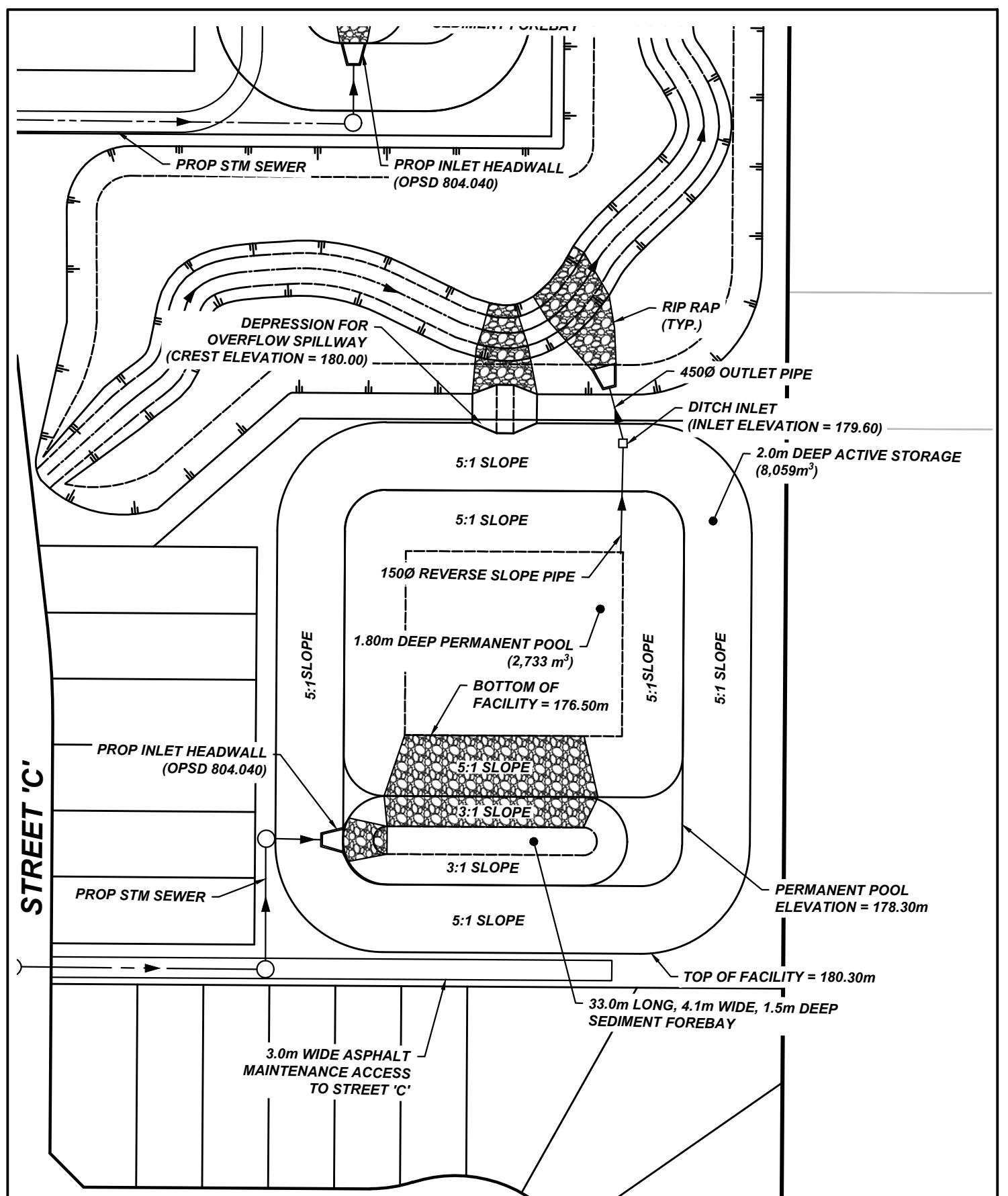
Is this Acceptable?   **Yes**   (Maximum velocity of flow = 0.15 m/s)

e) Cleanout Frequency

Is this Acceptable?   **Yes**

L =	33.0 m	(Proposed Bottom Length)
ASL =	3.13 m³/ha	(Annual Sediment Loading)
A =	12.96 ha	(Drainage Area)
FRC =	80 %	(Facility Removal Efficiency)
FV =	514.1 m³	(Forebay Volume)

Cleanout Frequency = **10.1** Years

Is this Acceptable?   **Yes**   (10 Year Minimum Cleanout Frequency)

PROP STM SEWER

PROP INLET HEADWALL
(OPSD 804.040)

DEPRESSION FOR
OVERFLOW SPILLWAY
(CREST ELEVATION = 180.00)

RIP RAP
(TYP.)

450Ø OUTLET PIPE

DITCH INLET
(INLET ELEVATION = 179.60)

2.0m DEEP ACTIVE STORAGE
(8,059m³)

5:1 SLOPE

5:1 SLOPE

150Ø REVERSE SLOPE PIPE

5:1 SLOPE

5:1 SLOPE

1.80m DEEP PERMANENT POOL
(2,733 m³)

BOTTOM OF
FACILITY = 176.50m

5:1 SLOPE

3:1 SLOPE

PROP INLET HEADWALL
(OPSD 804.040)

3:1 SLOPE

PERMANENT POOL
ELEVATION = 178.30m

PROP STM SEWER

5:1 SLOPE

STREET 'C'

TOP OF FACILITY = 180.30m

33.0m LONG, 4.1m WIDE, 1.5m DEEP
SEDIMENT FOREBAY

3.0m WIDE ASPHALT
MAINTENANCE ACCESS
TO STREET 'C'

UPPER CANADA CONSULTANTS ENGINEERS / PLANNERS	**210, 256 & 276 QUAKER ROAD** CITY OF WELLAND **STORMWATER MANAGEMENT POND P31**	DATE 2024−07−18
		SCALE 1:750 m
		REF No. 1601
		DWG No. FIGURE 6

Table 13 summarizes the peak inflows and outflows for the stormwater management facility along with corresponding pond elevations. Based on the MIDUSS model, Table 13 shows the maximum wet pond elevation of 179.88 m, and an active storage volume of 5,982 m^3 for the 100-year design storm event.

Table 13. Stormwater Management Wet Pond Facility 'P31' Characteristics				
Design Storm	**Peak Flows (L/s)**		**Maximum Elevation (m)**	**Maximum Storage (m3)**
	Future Inflow	**Future Outflow**		
25mm	922	32	178.84	1,746
2 Year	1,478	43	179.20	3,116
5 Year	1,765	48	179.39	3,856
10 Year	1,983	52	179.54	4,465
25 Year	2,245	107	179.71	5,183
100 Year	2,731	221	179.88	5,982

Table 14. SWM Facility 'P31' – MECP Quality Requirements Comparison		
SWM Facility Characteristic	**MECP Requirement**	**Provided by SWM Facility**
Permanent Pool Volume (m^3) - *minimum*	2,497 (min)	2,733
Extended Detention Volume (m^3) – *minimum*	2,114 (min)	4,692
Total Quality + Detention Storage (m^3) – *minimum*	4,615 (min)	7,425
Drawdown Time (hr) – *minimum*	24 (min)	26
Forebay Length (m) – *minimum*	29.30 (min)	33
Forebay Width (m) – *minimum*	3.66 (min)	4.10
Average Forebay Velocity (m/s) – *maximum*	0.15 (max)	0.07
Cleanout Frequency (years) - *minimum*	10 (min)	10

As shown in Table 14, the proposed stormwater management facility configuration satisfies the quality control requirements for the associated drainage area.

5.3   Overall Stormwater Management Plan

As previously discussed, UCC has prepared a comprehensive Future conditions MIDUSS model to include all of the proposed stormwater management facilities to be constructed within the properties for which UCC is providing engineering services. The facilities included in the model are SWM Facilities P10 through P50, as shown in Figures 3 and 4.

Within properties where there are no Planning Act Applications forthcoming at the time of writing this report, that UCC is not providing engineering services, or a stormwater management alternative has not been selected, existing conditions were assumed in accordance with the Implementation Plan (see Figure 2).

As part of the Planning Act Applications on the properties where UCC is providing engineering services, separate Stormwater Management Reports will be submitted to outline the detailed calculations for each proposed facility. For the purposes of this Stormwater Management Plan, Tables 15 through 21 have been including providing the summary of the characteristics of each SWMF designed by UCC in the NWWSP Area.

5.3.1   Block 2

As shown in Figure 1, Block 2 consists of a property where UCC is providing the engineering services (450 Rice Road) and the remaining property where UCC is not providing engineering services.

The 450 Rice Road will provide only stormwater management quality controls (Facility P20) which will be via an Oil/Grit Separator as the tributary drainage area (Areas A20 and A20a) is below 5.0 hectares. A separate SWM Plan will be submitted outlining the detailed calculations for this Block.

The adjacent lands where UCC is not providing engineering services have been assumed at existing conditions for the purposes of identifying future stormwater flows within the realigned watercourse. A separate SWM Plan will be submitted by the owner's engineering consultant addressing the future stormwater management within this property.

5.3.2   Block 3

As shown in Figure 1, Block 3 consists of lands owned by a single owner for which UCC is providing engineering services and will include two stormwater management facilities (P10 and P11). Facility P10 will be comprised of a dry pond and Oil/Grit Separator as the tributary drainage area to the Oil/Grit Separator (Areas A10) is below 5.0 hectares, and Facility P11 will be comprised of a single wet pond providing quality and quantity controls for areas A12, A13, and A14. A separate SWM Plan will be submitted outlining the detailed calculations for this Block.

Table 15, 16, and 17 below summarize the design characteristics for Facilites P10 and P11.

Table 15. Stormwater Management Dry Pond Facility 'P10' Characteristics				
Design Storm	**Peak Flows (L/s)**		**Maximum Elevation (m)**	**Maximum Storage (m3)**
	Future Inflow	**Future Outflow**		
25mm	273	23	185.94	390
2 Year	422	25	186.13	803
5 Year	497	26	186.26	1,035
10 Year	1,229	26	186.30	1,229
25 Year	0.644	27	186.41	1,531
100 Year	0.783	105	186.51	1,804

Table 16. Stormwater Management Wet Pond Facility 'P11' Characteristics				
Design Storm	**Peak Flows (L/s)**		**Maximum Elevation (m)**	**Maximum Storage (m3)**
	Future Inflow	**Future Outflow**		
25mm	584	14	185.31	1,163
2 Year	889	18	185.63	2,132
5 Year	1,052	20	185.81	2,641
10 Year	1,177	22	185.95	3,066
25 Year	1,367	48	186.14	3,650
100 Year	1,659	143	186.28	4,180

Table 17. SWM Facility 'P11' – MECP Quality Requirements Comparison		
SWM Facility Characteristic	**MECP Requirement**	**Provided by SWM Facility**
Permanent Pool Volume (m^3) - *minimum*	1,565 (min)	1,616
Extended Detention Volume (m^3) – *minimum*	1,350 (min)	3,519
Total Quality + Detention Storage (m^3) – *minimum*	2,915 (min)	5,135
Drawdown Time (hr) – *minimum*	24 (min)	40
Forebay Length (m) – *minimum*	19.80 (min)	21.00
Forebay Width (m) – *minimum*	2.41 (min)	2.50
Average Forebay Velocity (m/s) – *maximum*	0.15 (max)	0.06
Cleanout Frequency (years) - *minimum*	10 (min)	11

As shown in the above tables, Facilities P10 and P11 have adequate capacity to provide stormwater management quantity and quality controls in accordance with MECP requirements and the requirements of the Implementation Plan.

5.3.3   Block 4

As shown in Figure 1, Block 4 consists of multiple properties owned by a single owner for which UCC is providing engineering services separated by a property for which there is not expected to be a future Planning Act Application submitted in the near future.

The area fronting on Rice Road will be consolidated into multiple properties that will be subject to separate applications for Site Plan Approval. The stormwater management facility characteristics for quantity control (storage) within these areas are not presently known and have therefore been included at existing conditions. Stormwater management quality controls will also be provided in accordance with the Implementation Plan.

For the area fronting onto Quaker Road, it is proposed to constuct a single communal wet pond SWM Facility (P50) to provide quality and quantity controls for Areas A52, A53, and A54 prior to discharging to the Towpath Drain.

Additionally, there is an existing catchment area within these lands that drain to the existing unnamed tributary to the Welland Recreational Canal that was constructed as part of the College Park Subdivision.

For the purposes of this Stormwater Management Plan, it was assumed that the majority of this area will convey future stormwater flows to the Towpath Drain. However, a separate SWM Plan will be submitted outlining the detailed calculations for this Block to ensure that future stormwater flows to each watercourse are controlled to existing levels.

Table 20 and 21 below summarize the design characteristics for Facility P50.

Table 18. Stormwater Management Wet Pond Facility 'P50' Characteristics				
Design Storm	**Peak Flows (L/s)**		**Maximum Elevation (m)**	**Maximum Storage (m3)**
	Future Inflow	**Future Outflow**		
25mm	1,227	9	182.40	2,607
2 Year	1,923	17	182.70	4,589
5 Year	2,285	20	182.85	5,617
10 Year	2,514	21	182.96	6,474
25 Year	2,924	23	183.13	7,762
100 Year	3,539	132	183.33	9,342

Table 19. SWM Facility 'P50' – MECP Quality Requirements Comparison		
SWM Facility Characteristic	**MECP Requirement**	**Provided by SWM Facility**
Permanent Pool Volume (m^3) - *minimum*	3,287 (min)	5,743
Extended Detention Volume (m^3) – *minimum*	2,782 (min)	7,895
Total Quality + Detention Storage (m^3) – *minimum*	6,072 (min)	13,638
Drawdown Time (hr) – *minimum*	24 (min)	99
West Forebay		
Forebay Length (m) – *minimum*	12.42 (min)	18.50
Forebay Width (m) – *minimum*	1.55 (min)	3.80
Average Forebay Velocity (m/s) – *maximum*	0.15 (max)	0.04
Cleanout Frequency (years) - *minimum*	10 (min)	11
East Forebay		
Forebay Length (m) – *minimum*	6.98 (min)	18.50
Forebay Width (m) – *minimum*	0.87 (min)	3.80
Average Forebay Velocity (m/s) – *maximum*	0.15 (max)	0.03
Cleanout Frequency (years) - *minimum*	10 (min)	20

As shown in the above tables, Facility P50 has adequate capacity to provide stormwater management quantity and quality controls in accordance with MECP requirements and the requirements of the Implementation Plan.

5.3.4   Block 5

As shown in Figure 1, Block 5 consists of lands owned by multiple owners for which UCC is providing engineering services and will include a single communal wet pond SWM Facility (P40) providing quality and quantity controls for the Areas A40 to A45. A separate SWM Plan will be submitted outlining the detailed calculations for this Block.

Table 18 and 19 below summarize the design characteristics for Facility P40.

Table 20. Stormwater Management Wet Pond Facility 'P40' Characteristics				
Design Storm	**Peak Flows (L/s)**		**Maximum Elevation (m)**	**Maximum Storage (m3)**
	Future Inflow	**Future Outflow**		
25mm	1,513	41	186.59	3,005
2 Year	2,374	64	187.04	5,502
5 Year	2,832	72	187.27	6,887
10 Year	3,124	129	187.42	7,854
25 Year	3,648	198	187.60	9,121
100 Year	4,453	430	187.86	10,981

Table 21. SWM Facility 'P40' – MECP Quality Requirements Comparison		
SWM Facility Characteristic	**MECP Requirement**	**Provided by SWM Facility**
Permanent Pool Volume (m^3) - *minimum*	4,297 (min)	4,612
Extended Detention Volume (m^3) – *minimum*	3,593 (min)	7,091
Total Quality + Detention Storage (m^3) – *minimum*	7,890 (min)	11,703
Drawdown Time (hr) – *minimum*	24 (min)	30
West Forebay		
Forebay Length (m) – *minimum*	23.34 (min)	25.00
Forebay Width (m) – *minimum*	2.92 (min)	5.20
Average Forebay Velocity (m/s) – *maximum*	0.15 (max)	0.07
Cleanout Frequency (years) - *minimum*	10 (min)	10
East Forebay		
Forebay Length (m) – *minimum*	14.14 (min)	25.00
Forebay Width (m) – *minimum*	1.77 (min)	5.00
Average Forebay Velocity (m/s) – *maximum*	0.15 (max)	0.05
Cleanout Frequency (years) - *minimum*	10 (min)	10

As shown in the above tables, Facility P40 has adequate capacity to provide stormwater management quantity and quality controls in accordance with MECP requirements and the requirements of the Implementation Plan.

5.3.5   Existing and Future Peak Flow Comparison

As summarized in Table 22 below, the proposed SWM Facilities (P10 through P50) can provide adequate stormwater quantity controls to control future flows to the existing levels identified in the Implementation Plan at each identified outlet along the Towpath Drain during each storm event.

Table 22. Impacts of SWM Facilities on Peak Flows at Outlets A through D			
Design Storm	**Peak Flow (m³/s)**		
	Existing	**Future with SWM**	**Change**
Upstream of Rice Road Culvert Crossing – Outlet A1			
2 Year	1.317	0.983	-25.4%
5 Year	1.589	1.185	-25.4%
10 Year	1.800	1.344	-25.3%
25 Year	2.099	1.583	-24.6%
100 Year	2.558	1.908	-25.4%
Downstream of Rice Road Culvert Crossing – Outlet A2			
2 Year	3.301	2.916	-11.7%
5 Year	4.194	3.502	-16.5%
10 Year	4.777	3.959	-17.1%
25 Year	5.619	4.621	-17.8%
100 Year	6.987	5.662	-19.0%
Towpath Drain Upstream of Existing PSW – Outlet B			
2 Year	3.425	3.353	-2.1%
5 Year	4.367	4.015	-8.1%
10 Year	4.977	4.532	-8.9%
25 Year	5.863	5.284	-9.9%
100 Year	7.305	6.464	-11.5%
Downstream of First Avenue Culvert Crossing – Outlet C			
2 Year	4.035	4.031	-0.1%
5 Year	5.176	4.834	-6.6%
10 Year	5.914	5.467	-7.6%
25 Year	7.005	6.402	-8.6%
100 Year	8.781	7.881	-10.2%
Upstream of Niagara Street Culvert Crossing – Outlet D			
2 Year	4.509	4.177	-7.4%
5 Year	5.835	5.016	-14.0%
10 Year	6.678	5.677	-15.0%
25 Year	7.938	6.649	-16.2%
100 Year	9.995	8.188	-18.1%

6.0   SEDIMENT AND EROSION CONTROL

Sediment controls are required during construction. The proposed extended detention facility can be used for this purpose. Therefore, the proposed constructed wet pond facility should be constructed prior to the facility for sediment control during construction.

The following additional erosion and sediment controls will also be implemented during construction:

• Install silt control fencing along the limits of construction where overland flows will flow beyond the limits of the development or into downstream watercourse.

• Re-vegetate disturbed areas as soon as possible after grading works have been completed.

• Lot grading and siltation controls plans will be provided with sediment and erosion control measures to the appropriate agencies for approval during the final design stage.

• The Stormwater management facility be cleaned after construction prior to assumption by municipality.

7.0   STORMWATER MANAGEMENT FACILITY MAINTENANCE

Maintenance is a necessary and important aspect of urban stormwater quality and quantity measures such as constructed wetlands. Many pollutants (i.e. nutrients, metals, bacteria, etc.) bind to sediment and therefore removal of sediment on a scheduled basis is required.

The wet pond for this development is subject to frequent wetting and deposition of sediments as a result of frequent low intensity storm event. The purpose of the wet pond is to improve post development sediment and contaminant loadings by detaining the 'first flush' flow for a 24 hour period. For the initial operation period of the stormwater management facility, the required frequency of maintenance is not definitively known and many of the maintenance tasks will be performed on an 'as required' basis. For example, during the home construction phase of the development there will be a greater potential for increased maintenance frequency, which depends on the effectiveness of sediment and erosion control techniques employed.

Inspections of the wet pond will indicate whether or not maintenance is required. Inspections should be made after every significant storm during the first two years of operation or until all development is completed to ensure the wet pond is functioning properly. This may translate into an average of six inspections per year. Once all building activity is finalized, inspections shall be performed annually. The following points should be addressed during inspections of the facility.

a) Standing water above the inlet storm sewer invert a day or more after a storm may indicate a blockage in the reverse slope pipe or orifice. The blockage may be caused by trash or sediment and a visual inspection would be required to determine the cause.

b) The vegetation around the wet pond should be inspected to ensure its function and aesthetics. Visual inspections will indicate whether replacement of plantings are required. A decline in vegetation habitat may indicate that other aspects of the constructed wet pond are operating improperly, such as the detention times may be inadequate or excessive.

c) The accumulation of sediment and debris at the wet pond inlet sediment forebay or around the high water line of the wet pond should be inspected. This will indicate the need for sediment removal or debris clean up.

d) The wet pond has been created by excavating a detention area. The integrity of the embankments should be periodically checked to ensure that it remains watertight and the side slopes have not sloughed.

Grass cutting is a maintenance activity that is done solely for aesthetic purposes. It is recommended that grass cutting be eliminated. It should be noted that municipal by-laws may require regular grass maintenance for weed control.

Trash removal is an integral part of maintenance and an annual clean-up, usually in the spring, is a minimum requirement. After this, trash removal is performed as required basis on observation of trash build-up during inspections.

To ensure long term effectiveness, the sediment that accumulates in the forebay area should be removed periodically to ensure that sediment in not deposited throughout the facility. For sediment removal operations, typical grading/excavating equipment should be used to remove sediment from the inlet forebay and detention areas. Care should be taken to ensure that limited damage occurs to existing vegetation and habitat.

Generally, the sediment which is removed from the detention pond will not be contaminated to the point that it would be classified as hazardous waste. However, the sediment should be tested to determine the disposal options.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, the following conclusions are offered:

- Infiltration techniques are not suitable for this site as the primary control facility due to the low soil infiltration rates.

- Two proposed stormwater management wet pond facilities will provide stormwater quality, quantity and erosion controls to the proposed development.

- Multiple stormwater management facilities external to the subject lands will provide stormwater quality, quantity and erosion controls for the respective catchment areas, to be addressed in separate SWM Reports as part of forthcoming Planning Act Applications.

- Various lot level vegetative stormwater management practices can be implemented to enhance stormwater quality.

- This report was prepared in accordance with the provincial guidelines contained in "Stormwater Management Planning and Design Manual, March 2003".

The above conclusions lead to the following recommendations:

- That the stormwater management criteria established in this report be accepted.

- That two stormwater management wet pond facilities be constructed to provide stormwater quality protection to MECP *Enhanced* Protection levels and quantity controls as outlined in this report.

- That the external SWM Facilities be constructed to the criteria established in the separately submitted SWM Reports.

- That additional lot level controls and vegetative stormwater management practices as described previously in this report be implemented.

- That sediment and erosion controls during construction as described in this report be implemented.

Respectfully Submitted,

B. Kapteyn

Brendan Kapteyn, P.Eng.

LICENSED PROFESSIONAL ENGINEER
B. J. KAPTEYN
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PROVINCE OF ONTARIO

APPENDICES

APPENDIX A
Existing Conditions MIDUSS Output File

```
       Output File (4.7) EX.OUT     opened 2024-04-03  15:59
       Units used are defined by G =    9.810
          24  144   10.000    are MAXDT MAXHYD & DTMIN values
       Licensee: UPPER CANADA CONSULTANTS
35     COMMENT
       4    line(s) of comment
       STORMWATER MANAGEMENT PLAN
       QUAKER ROAD
       CITY OF WELLAND
       EXISTING CONDITIONS
35     COMMENT
       3    line(s) of comment
       ***********
       25mm STORM EVENT
       ***********
2      STORM
       1       1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
       512.000   Coefficient  a
       6.000     Constant  b    (min)
       .800      Exponent  c
       .450      Fraction to peak  r
       240.000   Duration    240 min
                  25.035 mm     Total depth
3      IMPERVIOUS
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .015      Manning "n"
       98.000    SCS Curve No or C
       .100      Ia/S Coefficient
       .518      Initial Abstraction
35     COMMENT
       3    line(s) of comment
       ***********
       AREA NORTH OF QUAKER
       ***********
4      CATCHMENT
       1.000     ID No.  99999
       15.820    Area in hectares
       325.000   Length (PERV) metres
       1.000     Gradient (%)
       35.000    Per cent Impervious
       325.000   Length (IMPERV)
       .000      %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
       74.000    SCS Curve No or C
       .100      Ia/S Coefficient
       8.924     Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .499      .000      .000      .000 c.m/s
       .098      .805      .346      C perv/imperv/total
15     ADD RUNOFF
       .499      .499      .000      .000 c.m/s
4      CATCHMENT
       2.000     ID No.  99999
       13.570    Area in hectares
       301.000   Length (PERV) metres
       1.000     Gradient (%)
       25.000    Per cent Impervious
       301.000   Length (IMPERV)
       .000      %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
       74.000    SCS Curve No or C
       .100      Ia/S Coefficient
       8.924     Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .309      .499      .000      .000 c.m/s
       .098      .802      .274      C perv/imperv/total
35     COMMENT
       3    line(s) of comment
       ***********************
       FLOW AT RICE ROAD
       ***********************
15     ADD RUNOFF
       .309      .808      .000      .000 c.m/s
4      CATCHMENT
       3.000     ID No.  99999
       14.520    Area in hectares
       311.000   Length (PERV) metres
       1.000     Gradient (%)
       35.000    Per cent Impervious
       311.000   Length (IMPERV)
       .000      %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
       74.000    SCS Curve No or C
       .100      Ia/S Coefficient
       8.924     Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .461      .808      .000      .000 c.m/s
       .098      .803      .345      C perv/imperv/total
15     ADD RUNOFF
       .461      1.269     .000      .000 c.m/s
4      CATCHMENT
       4.000     ID No.  99999
       45.500    Area in hectares
       551.000   Length (PERV) metres
       1.000     Gradient (%)
       21.000    Per cent Impervious
       551.000   Length (IMPERV)
       .000      %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
       74.000    SCS Curve No or C
       .100      Ia/S Coefficient
       8.924     Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .611      1.269     .000      .000 c.m/s
       .098      .804      .247      C perv/imperv/total
15     ADD RUNOFF
       .611      1.879     .000      .000 c.m/s
35     COMMENT
       3    line(s) of comment
       ***********
       AREA SOUTH OF QUAKER
       ***********

4      CATCHMENT
       5.000     ID No.  99999
       5.310     Area in hectares
       188.000   Length (PERV) metres
       1.000     Gradient (%)
       10.000    Per cent Impervious
       188.000   Length (IMPERV)
       .000      %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
       74.000    SCS Curve No or C
       .100      Ia/S Coefficient
       8.924     Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .051      1.879     .000      .000 c.m/s
       .098      .806      .169      C perv/imperv/total
15     ADD RUNOFF
       .051      1.930     .000      .000 c.m/s
4      CATCHMENT
       6.000     ID No.  99999
       43.410    Area in hectares
       538.000   Length (PERV) metres
       1.000     Gradient (%)
       9.000     Per cent Impervious
       538.000   Length (IMPERV)
       .000      %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
       74.000    SCS Curve No or C
       .100      Ia/S Coefficient
       8.924     Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .255      1.930     .000      .000 c.m/s
       .098      .803      .162      C perv/imperv/total
35     COMMENT
       3    line(s) of comment
       ***********************
       TOTAL FLOW AT FIRST AVENUE
       ***********************
15     ADD RUNOFF
       .255      2.185     .000      .000 c.m/s
9      ROUTE
       .000      Conduit Length
       .000      No Conduit defined
       .000      Zero lag
       .000      Beta weighting factor
       .000      Routing timestep
       0       No. of sub-reaches
       .255      2.185     2.185     .000 c.m/s
17     COMBINE
       1     Junction Node No.
       .255      2.185     2.185     2.185 c.m/s
14     START
       1    1=Zero; 2=Define
35     COMMENT
       3    line(s) of comment
       ***********
       AREA SOUTH OF QUAKER
       ***********
4      CATCHMENT
       7.000     ID No.  99999
       16.470    Area in hectares
       331.000   Length (PERV) metres
       1.000     Gradient (%)
       10.000    Per cent Impervious
       331.000   Length (IMPERV)
       .000      %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
       74.000    SCS Curve No or C
       .100      Ia/S Coefficient
       8.924     Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .149      .000      2.185     2.185 c.m/s
       .098      .805      .169      C perv/imperv/total
15     ADD RUNOFF
       .149      .149      2.185     2.185 c.m/s
9      ROUTE
       .000      Conduit Length
       .000      No Conduit defined
       .000      Zero lag
       .000      Beta weighting factor
       .000      Routing timestep
       0       No. of sub-reaches
       .149      .149      .149      2.185 c.m/s
17     COMBINE
       1     Junction Node No.
       .149      .149      .149      2.334 c.m/s
18     CONFLUENCE
       1     Junction Node No.
       .149      2.334     .149      .000 c.m/s
4      CATCHMENT
       8.000     ID No.  99999
       42.190    Area in hectares
       530.000   Length (PERV) metres
       1.000     Gradient (%)
       9.000     Per cent Impervious
       530.000   Length (IMPERV)
       .000      %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
       74.000    SCS Curve No or C
       .100      Ia/S Coefficient
       8.924     Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .250      2.334     .149      .000 c.m/s
       .098      .803      .162      C perv/imperv/total
35     COMMENT
       3    line(s) of comment
       ***************************
       TOTAL FLOW AT NIAGARA STREET
       ***************************
15     ADD RUNOFF
       .250      2.584     .149      .000 c.m/s
27     HYDROGRAPH DISPLAY
       5    is # of Hyeto/Hydrograph chosen
       Volume = .1074966E+05 c.m
14     START
       1    1=Zero; 2=Define
```

35   COMMENT
3   line(s) of comment
****
2-YEAR STORM EVENT
****
2   STORM
1   1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
755.000   Coefficient a
8.000   Constant b   (min)
.789   Exponent c
.450   Fraction to peak r
240.000   Duration   240 min
38.971 mm   Total depth
3   IMPERVIOUS
1   Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.015   Manning "n"
98.000   SCS Curve No or C
.100   Ia/S Coefficient
.518   Initial Abstraction
35   COMMENT
3   line(s) of comment
****
AREA NORTH OF QUAKER
****
4   CATCHMENT
1.000   ID No. 99999
15.820   Area in hectares
325.000   Length (PERV) metres
1.000   Gradient (%)
35.000   Per cent Impervious
325.000   Length (IMPERV)
.000   %Imp. with Zero Dpth
1   Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250   Manning "n"
74.000   SCS Curve No or C
.100   Ia/S Coefficient
8.924   Initial Abstraction
1   Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
.813   .000   .149   .000 c.m/s
.194   .859   .427   C perv/imperv/total
15   ADD RUNOFF
.813   .813   .149   .000 c.m/s
4   CATCHMENT
2.000   ID No. 99999
13.570   Area in hectares
301.000   Length (PERV) metres
1.000   Gradient (%)
25.000   Per cent Impervious
301.000   Length (IMPERV)
.000   %Imp. with Zero Dpth
1   Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250   Manning "n"
74.000   SCS Curve No or C
.100   Ia/S Coefficient
8.924   Initial Abstraction
1   Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
.504   .813   .149   .000 c.m/s
.194   .862   .361   C perv/imperv/total
35   COMMENT
3   line(s) of comment
****
FLOW AT RICE ROAD
****
15   ADD RUNOFF
.504   1.317   .149   .000 c.m/s
4   CATCHMENT
3.000   ID No. 99999
14.520   Area in hectares
311.000   Length (PERV) metres
1.000   Gradient (%)
35.000   Per cent Impervious
311.000   Length (IMPERV)
.000   %Imp. with Zero Dpth
1   Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250   Manning "n"
74.000   SCS Curve No or C
.100   Ia/S Coefficient
8.924   Initial Abstraction
1   Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
.749   1.317   .149   .000 c.m/s
.194   .861   .428   C perv/imperv/total
15   ADD RUNOFF
.749   2.066   .149   .000 c.m/s
4   CATCHMENT
4.000   ID No. 99999
45.500   Area in hectares
551.000   Length (PERV) metres
1.000   Gradient (%)
21.000   Per cent Impervious
551.000   Length (IMPERV)
.000   %Imp. with Zero Dpth
1   Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250   Manning "n"
74.000   SCS Curve No or C
.100   Ia/S Coefficient
8.924   Initial Abstraction
1   Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
1.153   2.066   .149   .000 c.m/s
.194   .868   .336   C perv/imperv/total
15   ADD RUNOFF
1.153   3.219   .149   .000 c.m/s
35   COMMENT
3   line(s) of comment
****
AREA SOUTH OF QUAKER
****

4   CATCHMENT
5.000   ID No. 99999
5.310   Area in hectares
188.000   Length (PERV) metres
1.000   Gradient (%)
10.000   Per cent Impervious
188.000   Length (IMPERV)
.000   %Imp. with Zero Dpth
1   Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250   Manning "n"
74.000   SCS Curve No or C
.100   Ia/S Coefficient
8.924   Initial Abstraction
1   Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
.082   3.219   .149   .000 c.m/s
.194   .863   .261   C perv/imperv/total
15   ADD RUNOFF
.082   3.301   .149   .000 c.m/s
4   CATCHMENT
6.000   ID No. 99999
43.410   Area in hectares
538.000   Length (PERV) metres
1.000   Gradient (%)
9.000   Per cent Impervious
538.000   Length (IMPERV)
.000   %Imp. with Zero Dpth
1   Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250   Manning "n"
74.000   SCS Curve No or C
.100   Ia/S Coefficient
8.924   Initial Abstraction
1   Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
.485   3.301   .149   .000 c.m/s
.194   .868   .255   C perv/imperv/total
35   COMMENT
3   line(s) of comment
****
TOTAL FLOW AT FIRST AVENUE
****
15   ADD RUNOFF
.485   3.786   .149   .000 c.m/s
9   ROUTE
.000   Conduit Length
.000   No Conduit defined
.000   Zero lag
.000   Beta weighting factor
.000   Routing timestep
0   No. of sub-reaches
.485   3.786   3.786   .000 c.m/s
17   COMBINE
1   Junction Node No.
.485   3.786   3.786   3.786 c.m/s
14   START
1   1=Zero; 2=Define
35   COMMENT
3   line(s) of comment
****
AREA SOUTH OF QUAKER
****
4   CATCHMENT
7.000   ID No. 99999
16.470   Area in hectares
331.000   Length (PERV) metres
1.000   Gradient (%)
10.000   Per cent Impervious
331.000   Length (IMPERV)
.000   %Imp. with Zero Dpth
1   Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250   Manning "n"
74.000   SCS Curve No or C
.100   Ia/S Coefficient
8.924   Initial Abstraction
1   Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
.249   .000   3.786   .000 c.m/s
.194   .858   .261   C perv/imperv/total
15   ADD RUNOFF
.249   .249   3.786   3.786 c.m/s
9   ROUTE
.000   Conduit Length
.000   No Conduit defined
.000   Zero lag
.000   Beta weighting factor
.000   Routing timestep
0   No. of sub-reaches
.249   .249   .249   3.786 c.m/s
17   COMBINE
1   Junction Node No.
.249   .249   .249   4.035 c.m/s
18   CONFLUENCE
1   Junction Node No.
.249   4.035   .249   .000 c.m/s
4   CATCHMENT
8.000   ID No. 99999
42.190   Area in hectares
530.000   Length (PERV) metres
1.000   Gradient (%)
9.000   Per cent Impervious
530.000   Length (IMPERV)
.000   %Imp. with Zero Dpth
1   Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.250   Manning "n"
74.000   SCS Curve No or C
.100   Ia/S Coefficient
8.924   Initial Abstraction
1   Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
.474   4.035   .249   .000 c.m/s
.194   .867   .255   C perv/imperv/total
35   COMMENT
3   line(s) of comment
****
TOTAL FLOW AT NIAGARA STREET
****
15   ADD RUNOFF
.474   4.509   .249   .000 c.m/s
27   HYDROGRAPH DISPLAY
5   is # of Hyeto/Hydrograph chosen
Volume = .2362202E+05 c.m
14   START
1   1=Zero; 2=Define

```
35    COMMENT                                          4    CATCHMENT
    3    line(s) of comment                              5.000    ID No.  99999
    ***********                                          5.310    Area in hectares
    5-YEAR STORM EVENT                                 188.000    Length (PERV) metres
    ***********                                          1.000    Gradient (%)
2    STORM                                              10.000    Per cent Impervious
    1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic  188.000    Length (IMPERV)
830.000    Coefficient   a                               .000    %Imp. with Zero Dpth
  7.300    Constant  b    (min)                            1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   .777    Exponent   c                                   .250    Manning "n"
   .450    Fraction to peak  r                          74.000    SCS Curve No or C
240.000    Duration    240 min                            .100    Ia/S Coefficient
        45.874 mm    Total depth                        8.924    Initial Abstraction
3    IMPERVIOUS                                             1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
    1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat    .101    4.093    .249    .000 c.m/s
   .015    Manning "n"                                          .236    .875    .300    C perv/imperv/total
 98.000    SCS Curve No or C                         15    ADD RUNOFF
   .100    Ia/S Coefficient                                   .101    4.194    .249    .000 c.m/s
   .518    Initial Abstraction                       4    CATCHMENT
35    COMMENT                                              6.000    ID No.  99999
    3    line(s) of comment                             43.410    Area in hectares
    ***********                                        538.000    Length (PERV) metres
    AREA NORTH OF QUAKER                                 1.000    Gradient (%)
    ***********                                          9.000    Per cent Impervious
4    CATCHMENT                                         538.000    Length (IMPERV)
    1.000    ID No.  99999                                 .000    %Imp. with Zero Dpth
 15.820    Area in hectares                                  1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
325.000    Length (PERV) metres                            .250    Manning "n"
  1.000    Gradient (%)                                  74.000    SCS Curve No or C
 35.000    Per cent Impervious                             .100    Ia/S Coefficient
325.000    Length (IMPERV)                                8.924    Initial Abstraction
   .000    %Imp. with Zero Dpth                              1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
    1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat    .676    4.194    .249    .000 c.m/s
   .250    Manning "n"                                          .236    .885    .294    C perv/imperv/total
 74.000    SCS Curve No or C                         35    COMMENT
   .100    Ia/S Coefficient                               3    line(s) of comment
  8.924    Initial Abstraction                            ************************
    1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv    TOTAL FLOW AT FIRST AVENUE
   .980    .000    .249    .000 c.m/s                    ************************
   .236    .880    .461    C perv/imperv/total       15    ADD RUNOFF
15    ADD RUNOFF                                             .676    4.870    .249    .000 c.m/s
   .980    .980    .249    .000 c.m/s                 9    ROUTE
4    CATCHMENT                                             .000    Conduit Length
    2.000    ID No.  99999                                 .000    No Conduit defined
 13.570    Area in hectares                                .000    Zero lag
301.000    Length (PERV) metres                            .000    Beta weighting factor
  1.000    Gradient (%)                                    .000    Routing timestep
 25.000    Per cent Impervious                               0    No. of sub-reaches
301.000    Length (IMPERV)                                 .676    4.870    4.870    .000 c.m/s
   .000    %Imp. with Zero Dpth                      17    COMBINE
    1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat    1    Junction Node No.
   .250    Manning "n"                                          .676    4.870    4.870    4.870 c.m/s
 74.000    SCS Curve No or C                         14    START
   .100    Ia/S Coefficient                               1    1=Zero; 2=Define
  8.924    Initial Abstraction                       35    COMMENT
    1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv    3    line(s) of comment
   .608    .980    .249    .000 c.m/s                    ***********
   .236    .883    .398    C perv/imperv/total           AREA SOUTH OF QUAKER
35    COMMENT                                            ***********
    3    line(s) of comment                        4    CATCHMENT
    ************************                             7.000    ID No.  99999
    FLOW AT RICE ROAD                                  16.470    Area in hectares
    ************************                           331.000    Length (PERV) metres
15    ADD RUNOFF                                         1.000    Gradient (%)
   .608    1.589    .249    .000 c.m/s                 10.000    Per cent Impervious
4    CATCHMENT                                         331.000    Length (IMPERV)
    3.000    ID No.  99999                                 .000    %Imp. with Zero Dpth
 14.520    Area in hectares                                  1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
311.000    Length (PERV) metres                            .250    Manning "n"
  1.000    Gradient (%)                                  74.000    SCS Curve No or C
 35.000    Per cent Impervious                             .100    Ia/S Coefficient
311.000    Length (IMPERV)                                8.924    Initial Abstraction
   .000    %Imp. with Zero Dpth                              1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
    1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat    .306    .000    4.870    4.870 c.m/s
   .250    Manning "n"                                          .236    .880    .300    C perv/imperv/total
 74.000    SCS Curve No or C                         15    ADD RUNOFF
   .100    Ia/S Coefficient                               .306    .306    4.870    4.870 c.m/s
  8.924    Initial Abstraction                       9    ROUTE
    1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv    .000    Conduit Length
   .902    1.589    .249    .000 c.m/s                  .000    No Conduit defined
   .236    .882    .462    C perv/imperv/total           .000    Zero lag
15    ADD RUNOFF                                         .000    Beta weighting factor
   .902    2.491    .249    .000 c.m/s                   .000    Routing timestep
4    CATCHMENT                                             0    No. of sub-reaches
    4.000    ID No.  99999                                 .306    .306    .306    4.870 c.m/s
 45.500    Area in hectares                          17    COMBINE
551.000    Length (PERV) metres                            1    Junction Node No.
  1.000    Gradient (%)                                    .306    .306    .306    5.176 c.m/s
 21.000    Per cent Impervious                       18    CONFLUENCE
551.000    Length (IMPERV)                                 1    Junction Node No.
   .000    %Imp. with Zero Dpth                            .306    5.176    .306    .000 c.m/s
    1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  4    CATCHMENT
   .250    Manning "n"                                     8.000    ID No.  99999
 74.000    SCS Curve No or C                            42.190    Area in hectares
   .100    Ia/S Coefficient                            530.000    Length (PERV) metres
  8.924    Initial Abstraction                          1.000    Gradient (%)
    1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv    9.000    Per cent Impervious
  1.602    2.491    .249    .000 c.m/s                530.000    Length (IMPERV)
   .236    .885    .372    C perv/imperv/total           .000    %Imp. with Zero Dpth
15    ADD RUNOFF                                             1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
  1.602    4.093    .249    .000 c.m/s                   .250    Manning "n"
35    COMMENT                                          74.000    SCS Curve No or C
    3    line(s) of comment                             .100    Ia/S Coefficient
    ***********                                         8.924    Initial Abstraction
    AREA SOUTH OF QUAKER                                  1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
    ***********                                          .659    5.176    .306    .000 c.m/s
                                                           .236    .885    .294    C perv/imperv/total
                                                  35    COMMENT
                                                       3    line(s) of comment
                                                       ****************************
                                                       TOTAL FLOW AT NIAGARA STREET
                                                       ****************************
                                                  15    ADD RUNOFF
                                                       .659    5.835    .306    .000 c.m/s
                                                  27    HYDROGRAPH DISPLAY
                                                       5    is # of Hyeto/Hydrograph chosen
                                                       Volume =  .3122033E+05 c.m
                                                  14    START
                                                       1    1=Zero; 2=Define
```

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35    COMMENT
   3    line(s) of comment
      ***********
      10-YEAR STORM EVENT
      ***********
 2    STORM
      1       1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
 860.000      Coefficient  a
   6.500      Constant  b    (min)
    .763      Exponent  c
    .450      Fraction to peak  r
 240.000      Duration    240 min
        51.471 mm     Total depth
 3    IMPERVIOUS
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .015      Manning "n"
  98.000      SCS Curve No or C
    .100      Ia/S Coefficient
    .518      Initial Abstraction
35    COMMENT
   3    line(s) of comment
      ***********
      AREA NORTH OF QUAKER
      ***********
 4    CATCHMENT
   1.000      ID No.  99999
  15.820      Area in hectares
 325.000      Length (PERV) metres
   1.000      Gradient (%)
  35.000      Per cent Impervious
 325.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         1.110    .000     .306      .000 c.m/s
          .267    .894     .486    C perv/imperv/total
15    ADD RUNOFF
         1.110   1.110     .306      .000 c.m/s
 4    CATCHMENT
   2.000      ID No.  99999
  13.570      Area in hectares
 301.000      Length (PERV) metres
   1.000      Gradient (%)
  25.000      Per cent Impervious
 301.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .690   1.110     .306      .000 c.m/s
          .267    .896     .424    C perv/imperv/total
35    COMMENT
   3    line(s) of comment
      ***********************
      FLOW AT RICE ROAD
      ***********************
15    ADD RUNOFF
          .690   1.800     .306      .000 c.m/s
 4    CATCHMENT
   3.000      ID No.  99999
  14.520      Area in hectares
 311.000      Length (PERV) metres
   1.000      Gradient (%)
  35.000      Per cent Impervious
 311.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         1.020   1.800     .306      .000 c.m/s
          .267    .896     .487    C perv/imperv/total
15    ADD RUNOFF
         1.020   2.820     .306      .000 c.m/s
 4    CATCHMENT
   4.000      ID No.  99999
  45.500      Area in hectares
 551.000      Length (PERV) metres
   1.000      Gradient (%)
  21.000      Per cent Impervious
 551.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         1.840   2.820     .306      .000 c.m/s
          .267    .896     .399    C perv/imperv/total
15    ADD RUNOFF
         1.840   4.660     .306      .000 c.m/s
35    COMMENT
   3    line(s) of comment
      ***********
      AREA SOUTH OF QUAKER
      ***********
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 4    CATCHMENT
   5.000      ID No.  99999
   5.310      Area in hectares
 188.000      Length (PERV) metres
   1.000      Gradient (%)
  10.000      Per cent Impervious
 188.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .117   4.660     .306      .000 c.m/s
          .267    .883     .328    C perv/imperv/total
15    ADD RUNOFF
          .117   4.777     .306      .000 c.m/s
 4    CATCHMENT
   6.000      ID No.  99999
  43.410      Area in hectares
 538.000      Length (PERV) metres
   1.000      Gradient (%)
   9.000      Per cent Impervious
 538.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .784   4.777     .306      .000 c.m/s
          .267    .896     .323    C perv/imperv/total
35    COMMENT
   3    line(s) of comment
      ************************
      TOTAL FLOW AT FIRST AVENUE
      ************************
15    ADD RUNOFF
          .784   5.561     .306      .000 c.m/s
 9    ROUTE
    .000      Conduit Length
    .000      No Conduit defined
    .000      Zero lag
    .000      Beta weighting factor
    .000      Routing timestep
      0       No. of sub-reaches
          .784   5.561    5.561      .000 c.m/s
17    COMBINE
      1       Junction Node No.
          .784   5.561    5.561     5.561 c.m/s
14    START
      1       1=Zero; 2=Define
35    COMMENT
   3    line(s) of comment
      ***********
      AREA SOUTH OF QUAKER
      ***********
 4    CATCHMENT
   7.000      ID No.  99999
  16.470      Area in hectares
 331.000      Length (PERV) metres
   1.000      Gradient (%)
  10.000      Per cent Impervious
 331.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .353    .000    5.561     5.561 c.m/s
          .267    .894     .329    C perv/imperv/total
15    ADD RUNOFF
          .353    .353    5.561     5.561 c.m/s
 9    ROUTE
    .000      Conduit Length
    .000      No Conduit defined
    .000      Zero lag
    .000      Beta weighting factor
    .000      Routing timestep
      0       No. of sub-reaches
          .353    .353     .353     5.561 c.m/s
17    COMBINE
      1       Junction Node No.
          .353    .353     .353     5.914 c.m/s
18    CONFLUENCE
      1       Junction Node No.
          .353   5.914     .353      .000 c.m/s
 4    CATCHMENT
   8.000      ID No.  99999
  42.190      Area in hectares
 530.000      Length (PERV) metres
   1.000      Gradient (%)
   9.000      Per cent Impervious
 530.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .764   5.914     .353      .000 c.m/s
          .267    .896     .323    C perv/imperv/total
35    COMMENT
   3    line(s) of comment
      ***************************
      TOTAL FLOW AT NIAGARA STREET
      ***************************
15    ADD RUNOFF
          .764   6.678     .353      .000 c.m/s
27    HYDROGRAPH DISPLAY
      5       is # of Hyeto/Hydrograph chosen
      Volume  =  .3783245E+05 c.m
14    START
      1       1=Zero; 2=Define
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35    COMMENT
   3    line(s) of comment
      ***********
      25-YEAR STORM EVENT
      ***********
 2    STORM
      1      1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
900.000    Coefficient  a
  5.200    Constant  b    (min)
   .745    Exponent  c
   .450    Fraction to peak  r
240.000    Duration    240 min
        59.713 mm     Total depth
 3    IMPERVIOUS
      1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   .015    Manning "n"
 98.000    SCS Curve No or C
   .100    Ia/S Coefficient
   .518    Initial Abstraction
35    COMMENT
   3    line(s) of comment
      ***********
      AREA NORTH OF QUAKER
      ***********
 4    CATCHMENT
  1.000      ID No.  99999
 15.820    Area in hectares
325.000    Length (PERV) metres
  1.000    Gradient (%)
 35.000    Per cent Impervious
325.000    Length (IMPERV)
   .000    %Imp. with Zero Dpth
      1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   .250    Manning "n"
 74.000    SCS Curve No or C
   .100    Ia/S Coefficient
  8.924    Initial Abstraction
      1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      1.306      .000      .353      .000 c.m/s
       .308      .910      .519    C perv/imperv/total
15    ADD RUNOFF
      1.306    1.306      .353      .000 c.m/s
 4    CATCHMENT
  2.000      ID No.  99999
 13.570    Area in hectares
301.000    Length (PERV) metres
  1.000    Gradient (%)
 25.000    Per cent Impervious
301.000    Length (IMPERV)
   .000    %Imp. with Zero Dpth
      1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   .250    Manning "n"
 74.000    SCS Curve No or C
   .100    Ia/S Coefficient
  8.924    Initial Abstraction
      1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .793    1.306      .353      .000 c.m/s
       .308      .910      .459    C perv/imperv/total
35    COMMENT
   3    line(s) of comment
      ***********************
      FLOW AT RICE ROAD
      ***********************
15    ADD RUNOFF
       .793    2.099      .353      .000 c.m/s
 4    CATCHMENT
  3.000      ID No.  99999
 14.520    Area in hectares
311.000    Length (PERV) metres
  1.000    Gradient (%)
 35.000    Per cent Impervious
311.000    Length (IMPERV)
   .000    %Imp. with Zero Dpth
      1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   .250    Manning "n"
 74.000    SCS Curve No or C
   .100    Ia/S Coefficient
  8.924    Initial Abstraction
      1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      1.164    2.099      .353      .000 c.m/s
       .308      .910      .519    C perv/imperv/total
15    ADD RUNOFF
      1.164    3.263      .353      .000 c.m/s
 4    CATCHMENT
  4.000      ID No.  99999
 45.500    Area in hectares
551.000    Length (PERV) metres
  1.000    Gradient (%)
 21.000    Per cent Impervious
551.000    Length (IMPERV)
   .000    %Imp. with Zero Dpth
      1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   .250    Manning "n"
 74.000    SCS Curve No or C
   .100    Ia/S Coefficient
  8.924    Initial Abstraction
      1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      2.211    3.263      .353      .000 c.m/s
       .308      .907      .434    C perv/imperv/total
15    ADD RUNOFF
      2.211    5.473      .353      .000 c.m/s
35    COMMENT
   3    line(s) of comment
      ***********
      AREA SOUTH OF QUAKER
      ***********

 4    CATCHMENT
  5.000      ID No.  99999
  5.310    Area in hectares
188.000    Length (PERV) metres
  1.000    Gradient (%)
 10.000    Per cent Impervious
188.000    Length (IMPERV)
   .000    %Imp. with Zero Dpth
      1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   .250    Manning "n"
 74.000    SCS Curve No or C
   .100    Ia/S Coefficient
  8.924    Initial Abstraction
      1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .146    5.473      .353      .000 c.m/s
       .308      .892      .367    C perv/imperv/total
15    ADD RUNOFF
       .146    5.619      .353      .000 c.m/s
 4    CATCHMENT
  6.000      ID No.  99999
 43.410    Area in hectares
538.000    Length (PERV) metres
  1.000    Gradient (%)
  9.000    Per cent Impervious
538.000    Length (IMPERV)
   .000    %Imp. with Zero Dpth
      1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   .250    Manning "n"
 74.000    SCS Curve No or C
   .100    Ia/S Coefficient
  8.924    Initial Abstraction
      1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .957    5.619      .353      .000 c.m/s
       .308      .906      .362    C perv/imperv/total
35    COMMENT
   3    line(s) of comment
      ***********************
      TOTAL FLOW AT FIRST AVENUE
      ***********************
15    ADD RUNOFF
       .957    6.576      .353      .000 c.m/s
 9    ROUTE
   .000    Conduit Length
   .000    No Conduit defined
   .000    Zero lag
   .000    Beta weighting factor
   .000    Routing timestep
      0      No. of sub-reaches
       .957    6.576    6.576      .000 c.m/s
17    COMBINE
      1      Junction Node No.
       .957    6.576    6.576    6.576 c.m/s
14    START
      1      1=Zero; 2=Define
35    COMMENT
   3    line(s) of comment
      ***********
      AREA SOUTH OF QUAKER
      ***********
 4    CATCHMENT
  7.000      ID No.  99999
 16.470    Area in hectares
331.000    Length (PERV) metres
  1.000    Gradient (%)
 10.000    Per cent Impervious
331.000    Length (IMPERV)
   .000    %Imp. with Zero Dpth
      1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   .250    Manning "n"
 74.000    SCS Curve No or C
   .100    Ia/S Coefficient
  8.924    Initial Abstraction
      1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .429      .000    6.576    6.576 c.m/s
       .308      .909      .369    C perv/imperv/total
15    ADD RUNOFF
       .429      .429    6.576    6.576 c.m/s
 9    ROUTE
   .000    Conduit Length
   .000    No Conduit defined
   .000    Zero lag
   .000    Beta weighting factor
   .000    Routing timestep
      0      No. of sub-reaches
       .429      .429      .429    6.576 c.m/s
17    COMBINE
      1      Junction Node No.
       .429      .429      .429    7.005 c.m/s
18    CONFLUENCE
      1      Junction Node No.
       .429    7.005      .429      .000 c.m/s
 4    CATCHMENT
  8.000      ID No.  99999
 42.190    Area in hectares
530.000    Length (PERV) metres
  1.000    Gradient (%)
  9.000    Per cent Impervious
530.000    Length (IMPERV)
   .000    %Imp. with Zero Dpth
      1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   .250    Manning "n"
 74.000    SCS Curve No or C
   .100    Ia/S Coefficient
  8.924    Initial Abstraction
      1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .933    7.005      .429      .000 c.m/s
       .308      .906      .362    C perv/imperv/total
35    COMMENT
   3    line(s) of comment
      ***************************
      TOTAL FLOW AT NIAGARA STREET
      ***************************
15    ADD RUNOFF
       .933    7.938      .429      .000 c.m/s
27    HYDROGRAPH DISPLAY
      5      is # of Hyeto/Hydrograph chosen
          Volume  =  .4820893E+05 c.m
14    START
      1      1=Zero; 2=Define
```

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35    COMMENT                                        4     CATCHMENT
      3    line(s) of comment                              5.000    ID No.  99999
      *************                                       5.310    Area in hectares
      100-YEAR STORM EVENT                                188.000  Length (PERV) metres
      *************                                       1.000    Gradient (%)
2     STORM                                              10.000   Per cent Impervious
      1      1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic 188.000  Length (IMPERV)
1020.000   Coefficient  a                                .000     %Imp. with Zero Dpth
4.700      Constant  b   (min)                            1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
.731       Exponent  c                                    .250     Manning "n"
.450       Fraction to peak  r                            74.000   SCS Curve No or C
240.000    Duration   240 min                             .100     Ia/S Coefficient
           73.203 mm    Total depth                       8.924    Initial Abstraction
3     IMPERVIOUS                                           1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  .199     6.789    .429     .000 c.m/s
      .015   Manning "n"                                          .367     .904     .421     C perv/imperv/total
      98.000 SCS Curve No or C                         15    ADD RUNOFF
      .100   Ia/S Coefficient                                .199     6.987    .429     .000 c.m/s
      .518   Initial Abstraction                       4     CATCHMENT
35    COMMENT                                                6.000    ID No.  99999
      3    line(s) of comment                               43.410   Area in hectares
      ***********                                           538.000  Length (PERV) metres
      AREA NORTH OF QUAKER                                  1.000    Gradient (%)
      ***********                                           9.000    Per cent Impervious
4     CATCHMENT                                             538.000  Length (IMPERV)
      1.000    ID No.  99999                                .000     %Imp. with Zero Dpth
      15.820   Area in hectares                             1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      325.000  Length (PERV) metres                         .250     Manning "n"
      1.000    Gradient (%)                                 74.000   SCS Curve No or C
      35.000   Per cent Impervious                          .100     Ia/S Coefficient
      325.000  Length (IMPERV)                              8.924    Initial Abstraction
      .000     %Imp. with Zero Dpth                         1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  1.246    6.987    .429     .000 c.m/s
      .250     Manning "n"                                          .368     .915     .417     C perv/imperv/total
      74.000   SCS Curve No or C                        35    COMMENT
      .100     Ia/S Coefficient                               3    line(s) of comment
      8.924    Initial Abstraction                           ************************
      1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  TOTAL FLOW AT FIRST AVENUE
      1.566    .000     .429     .000 c.m/s                  ************************
      .368     .924     .562     C perv/imperv/total  15    ADD RUNOFF
15    ADD RUNOFF                                             1.246    8.233    .429     .000 c.m/s
      1.566    1.566    .429     .000 c.m/s           9     ROUTE
4     CATCHMENT                                              .000     Conduit Length
      2.000    ID No.  99999                                .000     No Conduit defined
      13.570   Area in hectares                             .000     Zero lag
      301.000  Length (PERV) metres                         .000     Beta weighting factor
      1.000    Gradient (%)                                 .000     Routing timestep
      25.000   Per cent Impervious                          0        No. of sub-reaches
      301.000  Length (IMPERV)                              1.246    8.233    8.233    .000 c.m/s
      .000     %Imp. with Zero Dpth                  17    COMBINE
      1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  1        Junction Node No.
      .250     Manning "n"                                   1.246    8.233    8.233    8.233 c.m/s
      74.000   SCS Curve No or C                       14    START
      .100     Ia/S Coefficient                             1      1=Zero; 2=Define
      8.924    Initial Abstraction                     35    COMMENT
      1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  3    line(s) of comment
      .992     1.566    .429     .000 c.m/s                  ***********
      .367     .923     .506     C perv/imperv/total        AREA SOUTH OF QUAKER
35    COMMENT                                                ***********
      3    line(s) of comment                       4     CATCHMENT
      ************************                               7.000    ID No.  99999
      FLOW AT RICE ROAD                                     16.470   Area in hectares
      ************************                              331.000  Length (PERV) metres
15    ADD RUNOFF                                            1.000    Gradient (%)
      .992     2.558    .429     .000 c.m/s                 10.000   Per cent Impervious
4     CATCHMENT                                             331.000  Length (IMPERV)
      3.000    ID No.  99999                                .000     %Imp. with Zero Dpth
      14.520   Area in hectares                             1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      311.000  Length (PERV) metres                         .250     Manning "n"
      1.000    Gradient (%)                                 74.000   SCS Curve No or C
      35.000   Per cent Impervious                          .100     Ia/S Coefficient
      311.000  Length (IMPERV)                              8.924    Initial Abstraction
      .000     %Imp. with Zero Dpth                         1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  .548     .000     8.233    8.233 c.m/s
      .250     Manning "n"                                          .368     .925     .423     C perv/imperv/total
      74.000   SCS Curve No or C                       15    ADD RUNOFF
      .100     Ia/S Coefficient                             .548     .548     8.233    8.233 c.m/s
      8.924    Initial Abstraction                     9     ROUTE
      1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  .000     Conduit Length
      1.440    2.558    .429     .000 c.m/s                  .000     No Conduit defined
      .367     .923     .562     C perv/imperv/total        .000     Zero lag
15    ADD RUNOFF                                             .000     Beta weighting factor
      1.440    3.998    .429     .000 c.m/s                  .000     Routing timestep
4     CATCHMENT                                              0        No. of sub-reaches
      4.000    ID No.  99999                                .548     .548     .548     8.233 c.m/s
      45.500   Area in hectares                      17    COMBINE
      551.000  Length (PERV) metres                         1        Junction Node No.
      1.000    Gradient (%)                                  .548     .548     .548     8.781 c.m/s
      21.000   Per cent Impervious                   18    CONFLUENCE
      551.000  Length (IMPERV)                              1        Junction Node No.
      .000     %Imp. with Zero Dpth                         .548     8.781    .548     .000 c.m/s
      1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  4     CATCHMENT
      .250     Manning "n"                                   8.000    ID No.  99999
      74.000   SCS Curve No or C                            42.190   Area in hectares
      .100     Ia/S Coefficient                             530.000  Length (PERV) metres
      8.924    Initial Abstraction                          1.000    Gradient (%)
      1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  9.000    Per cent Impervious
      2.790    3.998    .429     .000 c.m/s                 530.000  Length (IMPERV)
      .368     .916     .483     C perv/imperv/total        .000     %Imp. with Zero Dpth
15    ADD RUNOFF                                             1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      2.790    6.789    .429     .000 c.m/s                  .250     Manning "n"
35    COMMENT                                                74.000   SCS Curve No or C
      3    line(s) of comment                               .100     Ia/S Coefficient
      ***********                                           8.924    Initial Abstraction
      AREA SOUTH OF QUAKER                                  1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      ***********                                           1.214    8.781    .548     .000 c.m/s
                                                            .368     .916     .417     C perv/imperv/total
                                                      35    COMMENT
                                                            3    line(s) of comment
                                                            ****************************
                                                            TOTAL FLOW AT NIAGARA STREET
                                                            ****************************
                                                      15    ADD RUNOFF
                                                            1.214    9.995    .548     .000 c.m/s
                                                      27    HYDROGRAPH DISPLAY
                                                            5      is # of Hyeto/Hydrograph chosen
                                                            Volume = .6645652E+05 c.m
                                                      14    START
                                                            1    1=Zero; 2=Define
```

APPENDIX B
Stormwater Management Facility Calculations (P30)

PROPOSED NORTH WET POND CALCULATIONS (POND P30)

Quality Requirements	Quality Orifice	Outlet Weir	Overflow Spillway	Outflow Pipe Orifice
Drainage Area (ha) = 10.42	Diameter (m) = 0.135	Perimeter Length (m) = 0.60	Length (m) = 2.50	Diameter (m) = 0.450
Enhanced (m3/ha) = 233	Cd = 0.63	Inlet Elevation (m) = 180.10	Slopes (X:1) = 10.00	Cd = 0.65
Perm Pool (m3/ha) = 193	Invert (m) = 178.80		Invert (m) = 180.60	Invert (m) = 178.80
Perm Pool Vol (m3) = 2,011				Obvert (m) = 179.25
Active Vol (m3) 417		**Pond Drawdown Time Calculation (MOE, 2003)**		Top of Pipe (m) = 179.35
25mm MOE Volume = 1,924		Water Surface Elevation during 25mm Design Storm Event =	179.28	
Water Level Elev. = 178.80 m		MOE Equation 4.11 Drawdown Coefficient 'C2' =	1,351	
		MOE Equation 4.11 Drawdown Coefficient 'C3' =	2,711	
		MOE Equation 4.11 Drawdown Time (h) =	**29**	

Elevation	Increment Depth (m)	Active Depth (m)	Surface Area (m2)	Average Surface Area (m2)	Increment Volume (m3)	Permanent Volume (m3)	Active Volume (m3)	Quality Orifice (m3/s)	Ditch Inlet (m3/s)	Max Pipe Orifice (m3/s)	Overflow Spillway (m3/s)	Total Outflow (m3/s)	Average Discharge (m3/s)
177.20		-1.60	812			0							
5:1 SLOPE	0.60			1,015	609								
177.80		-1.00	1,218			609							
5:1 SLOPE	0.50			1,410	705								
178.30		-0.50	1,602			1,314							
5:1 SLOPE	0.50			1,814	907								
178.80		**0.00**	**2,026**			**2,221**							
5:1 SLOPE													
178.80		**0.00**	**2,741**				**0**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	
5:1 SLOPE	0.50			3,039	1,520								0.023
179.30		0.50	3,338				1,520	0.026	0.000	0.205	0.000	0.026	
5:1 SLOPE	0.80			3,912	3,130								0.161
180.10		1.30	4,486				4,649	0.044	0.000	0.458	0.000	0.044	
5:1 SLOPE	0.50			4,840	2,420								0.554
180.60		1.80	5,194				7,069	0.052	0.362	0.561	0.000	0.414	
5:1 SLOPE	0.20			5,341	1,068								0.809
180.80		2.00	5,488				8,137	0.055	0.599	0.597	0.607	1.204	

Notes

1. Quality Orifice flow is the orifice controlling for the 24 hour detention period and uses an orifice formula.
2. Pipe Orifice flow is calcuated using an orifice formula on the pipe from the ditch inlet to the outlet and uses the total head on the orifice.
3. Overflow Weir flow is calculated using a trapezondial weir to convey outflow for less frequent storms through the embankment with an emergency spillway.
4. Total Outflow is calculated by adding the Overflow Spillway with the lowest of Quality Orifice plus Ditch Inlet or Max Pipe Orifice.

APPENDIX C
Stormwater Management Facility Calculations (P31)

Upper Canada Consultants
3-30 Hannover Drive
St. Catharines, ON, L2W 1A3
PROJECT NAME: **210, 256 & 276 QUAKER ROAD, CITY OF WELLAND**
PROJECT NO.:   **1601**

PROPOSED SOUTH WET POND CALCULATIONS (POND P31)

Quality Requirements	Quality Orifice	Outlet Weir	Overflow Spillway	Outflow Pipe Orifice
Drainage Area (ha) = 12.96	Diameter (m) = 0.150	Perimeter Length (m) = 0.60	Length (m) = 2.50	Diameter (m) = 0.450
Enhanced (m3/ha) = 233	Cd = 0.63	Inlet Elevation (m) = 179.60	Slopes (X:1) = 10.00	Cd = 0.65
Perm Pool (m3/ha) = 193	Invert (m) = 178.30		Invert (m) = 180.00	Invert (m) = 178.30
Perm Pool Vol (m3) = 2,501				Obvert (m) = 178.75
Active Vol (m3) 518		**Pond Drawdown Time Calculation (MOE, 2003)**		Top of Pipe (m) = 178.85
25mm MOE Volume = 2,114		Water Surface Elevation during 25mm Design Storm Event =	178.84	
Water Level Elev. = 178.30 m		MOE Equation 4.11 Drawdown Coefficient 'C2' =	1,193	
		MOE Equation 4.11 Drawdown Coefficient 'C3' =	2,819	
		MOE Equation 4.11 Drawdown Time (h) =	**26**	

Elevation	Increment Depth (m)	Active Depth (m)	Surface Area (m2)	Average Surface Area (m2)	Increment Volume (m3)	Permanent Volume (m3)	Active Volume (m3)	Quality Orifice (m3/s)	Ditch Inlet (m3/s)	Max Pipe Orifice (m3/s)	Overflow Spillway (m3/s)	Total Outflow (m3/s)	Average Discharge (m3/s)
176.50		-1.80	872			0							
5:1 SLOPE	0.80			1,141	913								
177.30		-1.00	1,409			913							
5:1 SLOPE	1.00			1,821	1,821								
178.30		**0.00**	**2,232**			**2,733**							
178.30		**0.00**	**2,888**				**0**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	
5:1 SLOPE	0.60			3,212	1,927								0.060
178.90		0.60	3,536				1,927	0.035	0.000	0.251	0.000	0.035	
5:1 SLOPE	0.70			3,950	2,765								0.080
179.60		1.30	4,363				4,692	0.054	0.000	0.458	0.000	0.054	
5:1 SLOPE	0.20			4,488	898								0.175
179.80		1.50	4,614				5,590	0.058	0.092	0.502	0.000	0.150	
5:1 SLOPE	0.20			4,742	948								0.798
180.00		1.70	4,870				6,538	0.062	0.259	0.542	0.000	0.321	
5:1 SLOPE	0.30			5,069	1,521								1.121
180.30		2.00	5,267				8,059	0.068	0.599	0.597	1.324	1.922	

Notes

1. Quality Orifice flow is the orifice controlling for the 24 hour detention period and uses an orifice formula.
2. Pipe Orifice flow is calcuated using an orifice formula on the pipe from the ditch inlet to the outlet and uses the total head on the orifice.
3. Overflow Weir flow is calculated using a trapezondial weir to convey outflow for less frequent storms through the embankment with an emergency spillway.
4. Total Outflow is calculated by adding the Overflow Spillway with the lowest of Quality Orifice plus Ditch Inlet or Max Pipe Orifice.

APPENDIX D
Future Conditions MIDUSS Output File

Development Conditions with SWM

```
          Output File (4.7) 25MM.OUT    opened 2024-10-16  18:02
          Units used are defined by G =    9.810
             24   144   10.000      are MAXDT MAXHYD & DTMIN values
          Licensee: UPPER CANADA CONSULTANTS
 35       COMMENT
           4    line(s) of comment
          STORMWATER MANAGEMENT PLAN
          QUAKER ROAD
          CITY OF WELLAND
          FUTURE CONDITIONS
 35       COMMENT
           3    line(s) of comment
          ****************************************************************
          25mm STORM EVENT
          ****************************************************************
  2       STORM
           1       1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
        512.000    Coefficient  a
          6.000    Constant  b    (min)
           .800    Exponent  c
           .450    Fraction to peak  r
        240.000    Duration ó 240 min
          25.035 mm      Total depth
  3       IMPERVIOUS
           1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .015    Manning "n"
         98.000    SCS Curve No or C
           .100    Ia/S Coefficient
           .518    Initial Abstraction
 35       COMMENT
           3    line(s) of comment
          *****************
          PROP DEVELOPMENT NORTH OF SEGMENT 1 - POND P10
          *****************
  4       CATCHMENT
         10.000      ID No.ó 99999
          4.050      Area in hectares
        164.000      Length (PERV) metres
          1.000      Gradient (%)
         70.000      Per cent Impervious
        164.000      Length (IMPERV)
           .000      %Imp. with Zero Dpth
           1         Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .250      Manning "n"
         74.000      SCS Curve No or C
           .100      Ia/S Coefficient
          8.924      Initial Abstraction
           1         Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .264       .000       .000       .000 c.m/s
           .098       .806       .594     C perv/imperv/total
 15       ADD RUNOFF
           .264       .264       .000       .000 c.m/s
  4       CATCHMENT
         11.000      ID No.ó 99999
          1.000      Area in hectares
         82.000      Length (PERV) metres
          1.000      Gradient (%)
         10.000      Per cent Impervious
         82.000      Length (IMPERV)
           .000      %Imp. with Zero Dpth
           1         Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .250      Manning "n"
         74.000      SCS Curve No or C
           .100      Ia/S Coefficient
          8.924      Initial Abstraction
           1         Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .009       .264       .000       .000 c.m/s
           .098       .791       .168     C perv/imperv/total
 15       ADD RUNOFF
           .009       .273       .000       .000 c.m/s
 10       POND
          6 Depth - Discharge - Volume sets
        184.800       .000         .0
        185.750      .0210        1.0
        186.000      .0230      503.0
        186.250      .0260     1091.0
        186.500      .0280     1765.0
        186.700     1.244      2370.0
          Peak Outflow   =       .023 c.m/s
          Maximum Depth  =   185.944 metres
          Maximum Storage =     390. c.m
           .009       .273       .023       .000 c.m/s
 14       START
           1       1=Zero; 2=Define
 35       COMMENT
           3    line(s) of comment
          *****************
          PROP DEVELOPMENT SOUTH OF SEGMENT 1 - POND P11
          *****************
  4       CATCHMENT
         12.000      ID No.ó 99999
          2.680      Area in hectares
        134.000      Length (PERV) metres
          1.000      Gradient (%)
         35.000      Per cent Impervious
        134.000      Length (IMPERV)
           .000      %Imp. with Zero Dpth
           1         Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .250      Manning "n"
         74.000      SCS Curve No or C
           .100      Ia/S Coefficient
          8.924      Initial Abstraction
           1         Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .088       .000       .023       .000 c.m/s
           .098       .801       .344     C perv/imperv/total
 15       ADD RUNOFF
```

```
           .088       .088       .023       .000 c.m/s
  4       CATCHMENT
         13.000      ID No.ó 99999
          6.980      Area in hectares
        216.000      Length (PERV) metres
          1.000      Gradient (%)
         70.000      Per cent Impervious
        216.000      Length (IMPERV)
           .000      %Imp. with Zero Dpth
           1         Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .250      Manning "n"
         74.000      SCS Curve No or C
           .100      Ia/S Coefficient
          8.924      Initial Abstraction
           1         Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .461       .088       .023       .000 c.m/s
           .098       .804       .592     C perv/imperv/total
 15       ADD RUNOFF
           .461       .549       .023       .000 c.m/s
  4       CATCHMENT
         14.000      ID No.ó 99999
           .670      Area in hectares
         67.000      Length (PERV) metres
          1.000      Gradient (%)
         60.000      Per cent Impervious
         67.000      Length (IMPERV)
           .000      %Imp. with Zero Dpth
           1         Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .250      Manning "n"
         74.000      SCS Curve No or C
           .100      Ia/S Coefficient
          8.924      Initial Abstraction
           1         Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .036       .549       .023       .000 c.m/s
           .098       .798       .518     C perv/imperv/total
 15       ADD RUNOFF
           .036       .584       .023       .000 c.m/s
 27       HYDROGRAPH DISPLAY
           5    is # of Hyeto/Hydrograph chosen
          Volume  = .1350286E+04 c.m
 10       POND
          5 Depth - Discharge - Volume sets
        184.800       .000         .0
        185.300      .0140     1142.0
        186.100      .0240     3519.0
        186.500      .287      4978.0
        186.800     1.922      6222.0
          Peak Outflow   =       .014 c.m/s
          Maximum Depth  =   185.307 metres
          Maximum Storage =    1163. c.m
           .036       .584       .014       .000 c.m/s
 14       START
           1       1=Zero; 2=Define
 35       COMMENT
           3    line(s) of comment
          ***********************
          PROP DEVELOPMENT SOUTH OF QUAKER RD & WEST OF RICE RD. - PON
          ***********************
  4       CATCHMENT
         40.000      ID No.ó 99999
          8.210      Area in hectares
        234.000      Length (PERV) metres
          1.000      Gradient (%)
         25.000      Per cent Impervious
        234.000      Length (IMPERV)
           .000      %Imp. with Zero Dpth
           1         Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .250      Manning "n"
         74.000      SCS Curve No or C
           .100      Ia/S Coefficient
          8.924      Initial Abstraction
           1         Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .193       .000       .014       .000 c.m/s
           .098       .800       .274     C perv/imperv/total
 15       ADD RUNOFF
           .193       .193       .014       .000 c.m/s
  9       ROUTE
           .000      Conduit Length
           .000      No Conduit defined
           .000      Zero lag
           .000      Beta weighting factor
           .000      Routing timestep
           0         No. of sub-reaches
           .193       .193       .193       .000 c.m/s
 17       COMBINE
           2       Junction Node No.
           .193       .193       .193       .193 c.m/s
 14       START
           1       1=Zero; 2=Define
  4       CATCHMENT
         41.000      ID No.ó 99999
           .690      Area in hectares
         68.000      Length (PERV) metres
          1.000      Gradient (%)
         35.000      Per cent Impervious
         68.000      Length (IMPERV)
           .000      %Imp. with Zero Dpth
           1         Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .250      Manning "n"
         74.000      SCS Curve No or C
           .100      Ia/S Coefficient
          8.924      Initial Abstraction
           1         Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .022       .000       .193       .000 c.m/s
           .098       .798       .343     C perv/imperv/total
 15       ADD RUNOFF
           .022       .022       .193       .193 c.m/s
  4       CATCHMENT
         42.000      ID No.ó 99999
```

```
      12.640     Area in hectares
     290.000     Length (PERV) metres
       1.000     Gradient (%)
      70.000     Per cent Impervious
     290.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      74.000     SCS Curve No or C
        .100     Ia/S Coefficient
       8.924     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .809         .022         .193         .193 c.m/s
             .098         .800         .590      C perv/imperv/total
15    ADD RUNOFF
             .809         .831         .193         .193 c.m/s
 9    ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
             .809         .831         .831         .193 c.m/s
17    COMBINE
           2     Junction Node No.
             .809         .831         .831        1.024 c.m/s
14    START
           1     1=Zero; 2=Define
 4    CATCHMENT
      43.000     ID No.ó 99999
        .330     Area in hectares
      47.000     Length (PERV) metres
       1.000     Gradient (%)
      35.000     Per cent Impervious
      47.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      74.000     SCS Curve No or C
        .100     Ia/S Coefficient
       8.924     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .011         .000         .831        1.024 c.m/s
             .098         .798         .343      C perv/imperv/total
15    ADD RUNOFF
             .011         .011         .831        1.024 c.m/s
 4    CATCHMENT
      44.000     ID No.ó 99999
       6.400     Area in hectares
     207.000     Length (PERV) metres
       1.000     Gradient (%)
      70.000     Per cent Impervious
     207.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      74.000     SCS Curve No or C
        .100     Ia/S Coefficient
       8.924     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .424         .011         .831        1.024 c.m/s
             .098         .805         .593      C perv/imperv/total
15    ADD RUNOFF
             .424         .433         .831        1.024 c.m/s
 9    ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
             .424         .433         .433        1.024 c.m/s
17    COMBINE
           2     Junction Node No.
             .424         .433         .433        1.457 c.m/s
14    START
           1     1=Zero; 2=Define
18    CONFLUENCE
           2     Junction Node No.
             .424        1.457         .433         .000 c.m/s
 4    CATCHMENT
      45.000     ID No.ó 99999
       1.030     Area in hectares
      83.000     Length (PERV) metres
       1.000     Gradient (%)
      60.000     Per cent Impervious
      83.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      74.000     SCS Curve No or C
        .100     Ia/S Coefficient
       8.924     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .056        1.457         .433         .000 c.m/s
             .098         .791         .514      C perv/imperv/total
15    ADD RUNOFF
             .056        1.513         .433         .000 c.m/s
27    HYDROGRAPH DISPLAY
           5     is # of Hyeto/Hydrograph chosen
      Volume = .3593299E+04 c.m
10    POND
      6 Depth - Discharge - Volume sets
     186.000         .000            .0
     186.800        .0550         4048.0
     187.300        .0730         7091.0
     187.500         .170         8424.0
     187.800         .257        10552.0
```

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     188.000         .880        12094.0
      Peak Outflow  =        .041 c.m/s
      Maximum Depth  =    186.594 metres
      Maximum Storage =       3005. c.m
             .056        1.513         .041         .000 c.m/s
14    START
           1     1=Zero; 2=Define
35    COMMENT
           3     line(s) of comment
      ***********
      PROP DEVELOPMENT SOUTH OF QUAKER, EAST OF RICE - POND P50
      ***********
 4    CATCHMENT
      52.000     ID No.ó 99999
       6.430     Area in hectares
     207.000     Length (PERV) metres
       1.000     Gradient (%)
      70.000     Per cent Impervious
     207.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      74.000     SCS Curve No or C
        .100     Ia/S Coefficient
       8.924     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .426         .000         .041         .000 c.m/s
             .098         .805         .593      C perv/imperv/total
15    ADD RUNOFF
             .426         .426         .041         .000 c.m/s
 9    ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
             .426         .426         .426         .000 c.m/s
17    COMBINE
           2     Junction Node No.
             .426         .426         .426         .426 c.m/s
14    START
           1     1=Zero; 2=Define
 4    CATCHMENT
      53.000     ID No.ó 99999
      11.340     Area in hectares
     275.000     Length (PERV) metres
       1.000     Gradient (%)
      70.000     Per cent Impervious
     275.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      74.000     SCS Curve No or C
        .100     Ia/S Coefficient
       8.924     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .731         .000         .426         .426 c.m/s
             .098         .798         .588      C perv/imperv/total
15    ADD RUNOFF
             .731         .731         .426         .426 c.m/s
 9    ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
           0     No. of sub-reaches
             .731         .731         .731         .426 c.m/s
17    COMBINE
           2     Junction Node No.
             .731         .731         .731        1.157 c.m/s
18    CONFLUENCE
           2     Junction Node No.
             .731        1.157         .731         .000 c.m/s
 4    CATCHMENT
      54.000     ID No.ó 99999
       1.280     Area in hectares
      92.000     Length (PERV) metres
       1.000     Gradient (%)
      60.000     Per cent Impervious
      92.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      74.000     SCS Curve No or C
        .100     Ia/S Coefficient
       8.924     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .070        1.157         .731         .000 c.m/s
             .098         .786         .511      C perv/imperv/total
15    ADD RUNOFF
             .070        1.227         .731         .000 c.m/s
27    HYDROGRAPH DISPLAY
           5     is # of Hyeto/Hydrograph chosen
      Volume = .2781534E+04 c.m
10    POND
      6 Depth - Discharge - Volume sets
     182.000         .000            .0
     182.800        .0190         5251.0
     183.150        .0230         7895.0
     183.500         .238        10751.0
     183.800         .396        13425.0
     184.000        1.028        15337.0
      Peak Outflow  =        .009 c.m/s
      Maximum Depth  =    182.397 metres
      Maximum Storage =       2607. c.m
             .070        1.227         .009         .000 c.m/s
14    START
```

```
    1    1=Zero; 2=Define
35    COMMENT
    3    line(s) of comment
         ***********
         PROP DEVELOPMENT NORTH OF SEGMENT 3 - POND P30
         ***********
 4    CATCHMENT
   30.000     ID No.ó 99999
    8.470     Area in hectares
  238.000     Length (PERV) metres
     .200     Gradient (%)
     .100     Per cent Impervious
  238.000     Length (IMPERV)
     .000     %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250     Manning "n"
   74.000     SCS Curve No or C
     .100     Ia/S Coefficient
    8.924     Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .007      .000      .009      .000 c.m/s
         .098      .803      .099      C perv/imperv/total
15    ADD RUNOFF
         .007      .007      .009      .000 c.m/s
 4    CATCHMENT
   31.000     ID No.ó 99999
   10.420     Area in hectares
  264.000     Length (PERV) metres
    1.000     Gradient (%)
   75.000     Per cent Impervious
  264.000     Length (IMPERV)
     .000     %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250     Manning "n"
   74.000     SCS Curve No or C
     .100     Ia/S Coefficient
    8.924     Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .723      .007      .009      .000 c.m/s
         .098      .798      .623      C perv/imperv/total
15    ADD RUNOFF
         .723      .724      .009      .000 c.m/s
27    HYDROGRAPH DISPLAY
    5    is # of Hyeto/Hydrograph chosen
         Volume  =  .1834827E+04 c.m
 4    CATCHMENT
   32.000     ID No.ó 99999
     .690     Area in hectares
   68.000     Length (PERV) metres
    1.000     Gradient (%)
   60.000     Per cent Impervious
   68.000     Length (IMPERV)
     .000     %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250     Manning "n"
   74.000     SCS Curve No or C
     .100     Ia/S Coefficient
    8.924     Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .037      .724      .009      .000 c.m/s
         .098      .798      .518      C perv/imperv/total
15    ADD RUNOFF
         .037      .760      .009      .000 c.m/s
27    HYDROGRAPH DISPLAY
    5    is # of Hyeto/Hydrograph chosen
         Volume  =  .1924289E+04 c.m
10    POND
    5 Depth - Discharge - Volume sets
  178.800      .000        .0
  179.300      .0260      1520.0
  180.100      .0440      4649.0
  180.600      .414       7069.0
  180.800     1.204       8137.0
  Peak Outflow    =      .025 c.m/s
  Maximum Depth   =   179.280 metres
  Maximum Storage =     1460. c.m
         .037      .760      .025      .000 c.m/s
14    START
    1    1=Zero; 2=Define
35    COMMENT
    3    line(s) of comment
         ***********
         PROP DEVELOPMENT SOUTH OF SEGMENT 3 - POND P31
         ***********
 4    CATCHMENT
   33.000     ID No.ó 99999
   12.960     Area in hectares
  294.000     Length (PERV) metres
    1.000     Gradient (%)
   75.000     Per cent Impervious
  294.000     Length (IMPERV)
     .000     %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250     Manning "n"
   74.000     SCS Curve No or C
     .100     Ia/S Coefficient
    8.924     Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .887      .000      .025      .000 c.m/s
         .098      .801      .625      C perv/imperv/total
15    ADD RUNOFF
         .887      .887      .025      .000 c.m/s
27    HYDROGRAPH DISPLAY
    5    is # of Hyeto/Hydrograph chosen
         Volume  =  .2028780E+04 c.m
 4    CATCHMENT
   34.000     ID No.ó 99999
     .660     Area in hectares
   66.000     Length (PERV) metres
```

```
    1.000     Gradient (%)
   60.000     Per cent Impervious
   66.000     Length (IMPERV)
     .000     %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250     Manning "n"
   74.000     SCS Curve No or C
     .100     Ia/S Coefficient
    8.924     Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .036      .887      .025      .000 c.m/s
         .098      .798      .518      C perv/imperv/total
15    ADD RUNOFF
         .036      .922      .025      .000 c.m/s
27    HYDROGRAPH DISPLAY
    5    is # of Hyeto/Hydrograph chosen
         Volume  =  .2114417E+04 c.m
10    POND
    6 Depth - Discharge - Volume sets
  178.300      .000        .0
  178.900      .0350      1927.0
  179.600      .0540      4692.0
  179.800      .150       5590.0
  180.000      .321       6538.0
  180.300     1.922       8059.0
  Peak Outflow    =      .032 c.m/s
  Maximum Depth   =   178.844 metres
  Maximum Storage =     1746. c.m
         .036      .922      .032      .000 c.m/s
14    START
    1    1=Zero; 2=Define
```

```
35    COMMENT
   3    line(s) of comment
      **********************************************************
      2-YEAR STORM EVENT
      **********************************************************
 2    STORM
         1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
   755.000    Coefficient  a
     8.000    Constant  b    (min)
      .789    Exponent  c
      .450    Fraction to peak  r
   240.000    Duration б  240 min
      38.971 mm      Total depth
 3    IMPERVIOUS
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .015    Manning "n"
    98.000    SCS Curve No or C
      .100    Ia/S Coefficient
      .518    Initial Abstraction
35    COMMENT
   3    line(s) of comment
      ******************
      EXISTING RES. WEST OF SEGMENT 1
      ******************
 4    CATCHMENT
     1.000    ID No.б 99999
    17.520    Area in hectares
   343.000    Length (PERV) metres
     1.000    Gradient (%)
    35.000    Per cent Impervious
   343.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    74.000    SCS Curve No or C
      .100    Ia/S Coefficient
     8.924    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .896      .000      .000      .000 c.m/s
            .194      .857      .426    C perv/imperv/total
15    ADD RUNOFF
            .896      .896      .000      .000 c.m/s
35    COMMENT
   3    line(s) of comment
      ******************
      REALIGNED CHANNEL - SEGMENT 1
      ******************
 4    CATCHMENT
   100.000    ID No.б 99999
     2.020    Area in hectares
   116.000    Length (PERV) metres
      .400    Gradient (%)
    15.000    Per cent Impervious
   116.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    74.000    SCS Curve No or C
      .100    Ia/S Coefficient
     8.924    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .046      .896      .000      .000 c.m/s
            .194      .862      .294    C perv/imperv/total
35    COMMENT
   3    line(s) of comment
      ******************
      FLOW AT FUT ROADWAY CULVERT - SEGMENT 1
      ******************
15    ADD RUNOFF
            .046      .941      .000      .000 c.m/s
 9    ROUTE
      .000    Conduit Length
      .000    No Conduit defined
      .000    Zero lag
      .000    Beta weighting factor
      .000    Routing timestep
         0    No. of sub-reaches
            .046      .941      .941      .000 c.m/s
17    COMBINE
         1    Junction Node No.
            .046      .941      .941      .941 c.m/s
14    START
         1    1=Zero; 2=Define
35    COMMENT
   3    line(s) of comment
      ******************
      PROP DEVELOPMENT NORTH OF SEGMENT 1 - POND P10
      ******************
 4    CATCHMENT
    10.000    ID No.б 99999
     4.050    Area in hectares
   164.000    Length (PERV) metres
     1.000    Gradient (%)
    70.000    Per cent Impervious
   164.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    74.000    SCS Curve No or C
      .100    Ia/S Coefficient
     8.924    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .406      .000      .941      .941 c.m/s
            .194      .857      .658    C perv/imperv/total
15    ADD RUNOFF
            .406      .406      .941      .941 c.m/s
 4    CATCHMENT
    11.000    ID No.б 99999
     1.000    Area in hectares
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    82.000    Length (PERV) metres
     1.000    Gradient (%)
    10.000    Per cent Impervious
    82.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    74.000    SCS Curve No or C
      .100    Ia/S Coefficient
     8.924    Initial Abstraction
         1    Option 1=Triangllr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .015      .406      .941      .941 c.m/s
            .194      .858      .261    C perv/imperv/total
15    ADD RUNOFF
            .015      .422      .941      .941 c.m/s
10    POND
      6 Depth - Discharge - Volume sets
   184.800      .000          .0
   185.750      .0210        1.0
   186.000      .0230      503.0
   186.250      .0260     1091.0
   186.500      .0280     1765.0
   186.700     1.244      2370.0
      Peak Outflow    =      .025 c.m/s
      Maximum Depth   =   186.128 metres
      Maximum Storage =      803. c.m
            .015      .422      .025      .941 c.m/s
17    COMBINE
         1    Junction Node No.
            .015      .422      .025      .963 c.m/s
14    START
         1    1=Zero; 2=Define
18    CONFLUENCE
         1    Junction Node No.
            .015      .963      .025      .000 c.m/s
35    COMMENT
   3    line(s) of comment
      ******************
      REALIGNED CHANNEL - SEGMENT 1
      ******************
 4    CATCHMENT
   101.000    ID No.б 99999
      .610    Area in hectares
    64.000    Length (PERV) metres
     1.000    Gradient (%)
    10.000    Per cent Impervious
    64.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    74.000    SCS Curve No or C
      .100    Ia/S Coefficient
     8.924    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .010      .963      .025      .000 c.m/s
            .194      .855      .260    C perv/imperv/total
15    ADD RUNOFF
            .010      .972      .025      .000 c.m/s
 9    ROUTE
      .000    Conduit Length
      .000    No Conduit defined
      .000    Zero lag
      .000    Beta weighting factor
      .000    Routing timestep
         0    No. of sub-reaches
            .010      .972      .972      .000 c.m/s
17    COMBINE
         1    Junction Node No.
            .010      .972      .972      .972 c.m/s
14    START
         1    1=Zero; 2=Define
35    COMMENT
   3    line(s) of comment
      ******************
      PROP DEVELOPMENT SOUTH OF SEGMENT 1 - POND P11
      ******************
 4    CATCHMENT
    12.000    ID No.б 99999
     2.680    Area in hectares
   134.000    Length (PERV) metres
     1.000    Gradient (%)
    35.000    Per cent Impervious
   134.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    74.000    SCS Curve No or C
      .100    Ia/S Coefficient
     8.924    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .134      .000      .972      .972 c.m/s
            .194      .850      .424    C perv/imperv/total
15    ADD RUNOFF
            .134      .134      .972      .972 c.m/s
 4    CATCHMENT
    13.000    ID No.б 99999
     6.980    Area in hectares
   216.000    Length (PERV) metres
     1.000    Gradient (%)
    70.000    Per cent Impervious
   216.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    74.000    SCS Curve No or C
      .100    Ia/S Coefficient
     8.924    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .704      .134      .972      .972 c.m/s
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                .194      .867      .665      C perv/imperv/total
15     ADD RUNOFF
                .704      .838      .972      .972 c.m/s
 4     CATCHMENT
    14.000     ID No.ó 99999
      .670     Area in hectares
    67.000     Length (PERV) metres
     1.000     Gradient (%)
    60.000     Per cent Impervious
    67.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .060      .838      .972      .972 c.m/s
                .194      .856      .592      C perv/imperv/total
15     ADD RUNOFF
                .060      .889      .972      .972 c.m/s
27     HYDROGRAPH DISPLAY
         5    is # of Hyeto/Hydrograph chosen
         Volume  =  .2406793E+04 c.m
10     POND
         5 Depth - Discharge - Volume sets
       184.800      .000        .0
       185.300      .0140     1142.0
       186.100      .0240     3519.0
       186.500      .287      4978.0
       186.800     1.922      6222.0
         Peak Outflow   =      .018 c.m/s
         Maximum Depth   =   185.633 metres
         Maximum Storage =     2132. c.m
                .060      .889      .018      .972 c.m/s
35     COMMENT
         3    line(s) of comment
         *****************
         FLOW U/S OF RICE RD CULVERT - OUTLET A1
         *****************
17     COMBINE
         1    Junction Node No.
                .060      .889      .018      .983 c.m/s
14     START
         1    1=Zero; 2=Define
35     COMMENT
         3    line(s) of comment
         ***********************
         PROP DEVELOPMENT SOUTH OF QUAKER RD & WEST OF RICE RD. - PON
         ***********************
 4     CATCHMENT
    40.000     ID No.ó 99999
     8.210     Area in hectares
   234.000     Length (PERV) metres
     1.000     Gradient (%)
    25.000     Per cent Impervious
   234.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .300      .000      .018      .983 c.m/s
                .194      .868      .363      C perv/imperv/total
15     ADD RUNOFF
                .300      .300      .018      .983 c.m/s
 9     ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
         0     No. of sub-reaches
                .300      .300      .300      .983 c.m/s
17     COMBINE
         2    Junction Node No.
                .300      .300      .300      .300 c.m/s
14     START
         1    1=Zero; 2=Define
 4     CATCHMENT
    41.000     ID No.ó 99999
      .690     Area in hectares
    68.000     Length (PERV) metres
     1.000     Gradient (%)
    35.000     Per cent Impervious
    68.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .036      .000      .300      .300 c.m/s
                .194      .857      .426      C perv/imperv/total
15     ADD RUNOFF
                .036      .036      .300      .300 c.m/s
 4     CATCHMENT
    42.000     ID No.ó 99999
    12.640     Area in hectares
   290.000     Length (PERV) metres
     1.000     Gradient (%)
    70.000     Per cent Impervious
   290.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"

    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                1.302     .036      .300      .300 c.m/s
                .194      .863      .662      C perv/imperv/total
15     ADD RUNOFF
                1.302     1.333     .300      .300 c.m/s
 9     ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
         0     No. of sub-reaches
                1.302     1.333     1.333     .300 c.m/s
17     COMBINE
         2    Junction Node No.
                1.302     1.333     1.333     1.633 c.m/s
14     START
         1    1=Zero; 2=Define
 4     CATCHMENT
    43.000     ID No.ó 99999
      .330     Area in hectares
    47.000     Length (PERV) metres
     1.000     Gradient (%)
    35.000     Per cent Impervious
    47.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .018      .000      1.333     1.633 c.m/s
                .194      .858      .426      C perv/imperv/total
15     ADD RUNOFF
                .018      .018      1.333     1.633 c.m/s
 4     CATCHMENT
    44.000     ID No.ó 99999
     6.400     Area in hectares
   207.000     Length (PERV) metres
     1.000     Gradient (%)
    70.000     Per cent Impervious
   207.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .646      .018      1.333     1.633 c.m/s
                .194      .866      .665      C perv/imperv/total
15     ADD RUNOFF
                .646      .660      1.333     1.633 c.m/s
 9     ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
         0     No. of sub-reaches
                .646      .660      .660      1.633 c.m/s
17     COMBINE
         2    Junction Node No.
                .646      .660      .660      2.293 c.m/s
14     START
         1    1=Zero; 2=Define
18     CONFLUENCE
         2    Junction Node No.
                .646      2.293     .660      .000 c.m/s
 4     CATCHMENT
    45.000     ID No.ó 99999
     1.030     Area in hectares
    83.000     Length (PERV) metres
     1.000     Gradient (%)
    60.000     Per cent Impervious
    83.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .088      2.293     .660      .000 c.m/s
                .194      .857      .592      C perv/imperv/total
15     ADD RUNOFF
                .088      2.374     .660      .000 c.m/s
27     HYDROGRAPH DISPLAY
         5    is # of Hyeto/Hydrograph chosen
         Volume  =  .6483683E+04 c.m
10     POND
         6 Depth - Discharge - Volume sets
       186.000      .000        .0
       186.800      .0550     4048.0
       187.300      .0730     7091.0
       187.500      .170      8424.0
       187.800      .257     10552.0
       188.000      .880     12094.0
         Peak Outflow   =      .064 c.m/s
         Maximum Depth   =   187.039 metres
         Maximum Storage =     5502. c.m
                .088      2.374     .064      .000 c.m/s
17     COMBINE
         2    Junction Node No.
                .088      2.374     .064      .064 c.m/s
```

```
  14     START
   1      1=Zero; 2=Define
  35     COMMENT
   3      line(s) of comment
          ***********************
          EXISTING AREA ON QUAKER RD, WEST OF RICE RD
          ***********************
   4     CATCHMENT
   2.000      ID No.ó 99999
   9.020      Area in hectares
 245.000      Length (PERV) metres
   1.000      Gradient (%)
  40.000      Per cent Impervious
 245.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .520        .000        .064        .064 c.m/s
           .194        .868        .464     C perv/imperv/total
  15     ADD RUNOFF
           .520        .520        .064        .064 c.m/s
   9     ROUTE
    .000      Conduit Length
    .000      No Conduit defined
    .000      Zero lag
    .000      Beta weighting factor
    .000      Routing timestep
      0       No. of sub-reaches
           .520        .520        .520        .064 c.m/s
  17     COMBINE
   2      Junction Node No.
           .520        .520        .520        .548 c.m/s
  14     START
   1      1=Zero; 2=Define
  18     CONFLUENCE
   2      Junction Node No.
           .520        .548        .520        .000 c.m/s
  35     COMMENT
   3      line(s) of comment
          ***********************
          EXISTING AREA ON QUAKER RD, WEST OF RICE RD
          ***********************
   4     CATCHMENT
   3.000      ID No.ó 99999
   5.680      Area in hectares
 195.000      Length (PERV) metres
   1.000      Gradient (%)
  40.000      Per cent Impervious
 195.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .330        .548        .520        .000 c.m/s
           .194        .865        .462     C perv/imperv/total
  15     ADD RUNOFF
           .330        .878        .520        .000 c.m/s
   9     ROUTE
    .000      Conduit Length
    .000      No Conduit defined
    .000      Zero lag
    .000      Beta weighting factor
    .000      Routing timestep
      0       No. of sub-reaches
           .330        .878        .878        .000 c.m/s
  17     COMBINE
   2      Junction Node No.
           .330        .878        .878        .878 c.m/s
  14     START
   1      1=Zero; 2=Define
  35     COMMENT
   3      line(s) of comment
          ***********************
          PROP DEVELOPMENT SOUTH OF QUAKER RD, EAST OF RICE RD
          ***********************
   4     CATCHMENT
  50.000      ID No.ó 99999
   3.420      Area in hectares
 151.000      Length (PERV) metres
   1.000      Gradient (%)
  10.000      Per cent Impervious
 151.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .053        .000        .878        .878 c.m/s
           .194        .854        .260     C perv/imperv/total
  15     ADD RUNOFF
           .053        .053        .878        .878 c.m/s
   4     CATCHMENT
  51.000      ID No.ó 99999
   1.980      Area in hectares
 115.000      Length (PERV) metres
   1.000      Gradient (%)
  10.000      Per cent Impervious
 115.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
```

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           .250        Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .031        .053        .878        .878 c.m/s
           .194        .850        .260     C perv/imperv/total
  15     ADD RUNOFF
           .031        .084        .878        .878 c.m/s
   9     ROUTE
    .000      Conduit Length
    .000      No Conduit defined
    .000      Zero lag
    .000      Beta weighting factor
    .000      Routing timestep
      0       No. of sub-reaches
           .031        .084        .084        .878 c.m/s
  17     COMBINE
   2      Junction Node No.
           .031        .084        .084        .962 c.m/s
  14     START
   1      1=Zero; 2=Define
  35     COMMENT
   3      line(s) of comment
          ***********************
          EXISTING AREA WEST OF RICE RD AND SOUTH OF QUAKER ROAD
          ***********************
   4     CATCHMENT
   4.000      ID No.ó 99999
  13.940      Area in hectares
 305.000      Length (PERV) metres
   1.000      Gradient (%)
  40.000      Per cent Impervious
 305.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .822        .000        .084        .962 c.m/s
           .194        .862        .461     C perv/imperv/total
  15     ADD RUNOFF
           .822        .822        .084        .962 c.m/s
   9     ROUTE
    .000      Conduit Length
    .000      No Conduit defined
    .000      Zero lag
    .000      Beta weighting factor
    .000      Routing timestep
      0       No. of sub-reaches
           .822        .822        .822        .962 c.m/s
  17     COMBINE
   2      Junction Node No.
           .822        .822        .822       1.784 c.m/s
  14     START
   1      1=Zero; 2=Define
  18     CONFLUENCE
   2      Junction Node No.
           .822       1.784        .822        .000 c.m/s
  35     COMMENT
   3      line(s) of comment
          *****************
          RICE ROAD FROM QUAKER RD TO CITY OF WELLAND MUNICIPAL BOUNDA
          *****************
   4     CATCHMENT
 501.000      ID No.ó 99999
   1.570      Area in hectares
 102.000      Length (PERV) metres
   1.000      Gradient (%)
  70.000      Per cent Impervious
 102.000      Length (IMPERV)
    .000      %Imp. with Zero Dpth
      1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250      Manning "n"
  74.000      SCS Curve No or C
    .100      Ia/S Coefficient
   8.924      Initial Abstraction
      1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .149       1.784        .822        .000 c.m/s
           .194        .854        .656     C perv/imperv/total
  15     ADD RUNOFF
           .149       1.933        .822        .000 c.m/s
   9     ROUTE
    .000      Conduit Length
    .000      No Conduit defined
    .000      Zero lag
    .000      Beta weighting factor
    .000      Routing timestep
      0       No. of sub-reaches
           .149       1.933       1.933        .000 c.m/s
  35     COMMENT
   3      line(s) of comment
          *****************
          FLOW D/S OF RICE RD CULVERT - OUTLET A2
          *****************
  17     COMBINE
   1      Junction Node No.
           .149       1.933       1.933       2.916 c.m/s
  14     START
   1      1=Zero; 2=Define
  35     COMMENT
   3      line(s) of comment
          *****************
          PROP DEVELOPMENT SOUTH OF QUAKER RD - QUALLITY CONTROL ONLY
          *****************
   4     CATCHMENT
  20.100      ID No.ó 99999
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        .780      Area in hectares                            35      COMMENT
      72.000      Length (PERV) metres                          3     line(s) of comment
       1.000      Gradient (%)                                        ***********************
      35.000      Per cent Impervious                                 FLOW U/S OF FIRST AVE CULVERT
      72.000      Length (IMPERV)                                     ***********************
        .000      %Imp. with Zero Dpth                         17      COMBINE
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  1     Junction Node No.
        .250      Manning "n"                                             .181     3.489       3.489       3.489 c.m/s
      74.000      SCS Curve No or C                            14      START
        .100      Ia/S Coefficient                              1     1=Zero; 2=Define
       8.924      Initial Abstraction                          35      COMMENT
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  3     line(s) of comment
        .040        .000      1.933      2.916 c.m/s                     ***********
        .194        .857       .426    C perv/imperv/total               PROP DEVELOPMENT SOUTH OF QUAKER, EAST OF RICE - POND P50
15      ADD RUNOFF                                                      ***********
        .040        .040      1.933      2.916 c.m/s           4       CATCHMENT
 4      CATCHMENT                                                    52.000      ID No.б 99999
      20.000      ID No.б 99999                                       6.430      Area in hectares
       3.210      Area in hectares                                  207.000      Length (PERV) metres
     146.000      Length (PERV) metres                                1.000      Gradient (%)
       1.000      Gradient (%)                                       70.000      Per cent Impervious
      85.000      Per cent Impervious                               207.000      Length (IMPERV)
     146.000      Length (IMPERV)                                     .000      %Imp. with Zero Dpth
        .000      %Imp. with Zero Dpth                                   1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  .250      Manning "n"
        .250      Manning "n"                                        74.000      SCS Curve No or C
      74.000      SCS Curve No or C                                    .100      Ia/S Coefficient
        .100      Ia/S Coefficient                                   8.924      Initial Abstraction
       8.924      Initial Abstraction                                    1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  .649       .000      3.489       3.489 c.m/s
        .386        .040      1.933      2.916 c.m/s                     .194        .866       .665    C perv/imperv/total
        .194        .854       .755    C perv/imperv/total    15      ADD RUNOFF
15      ADD RUNOFF                                                      .649        .649      3.489       3.489 c.m/s
        .386        .422      1.933      2.916 c.m/s            9      ROUTE
 9      ROUTE                                                          .000      Conduit Length
        .000      Conduit Length                                       .000      No Conduit defined
        .000      No Conduit defined                                   .000      Zero lag
        .000      Zero lag                                             .000      Beta weighting factor
        .000      Beta weighting factor                                .000      Routing timestep
        .000      Routing timestep                                       0      No. of sub-reaches
           0      No. of sub-reaches                                    .649        .649       .649      3.489 c.m/s
        .386        .422       .422      2.916 c.m/s           17      COMBINE
17      COMBINE                                                       2     Junction Node No.
        1     Junction Node No.                                        .649        .649       .649       .649 c.m/s
        .386        .422       .422      3.338 c.m/s           14      START
14      START                                                        1     1=Zero; 2=Define
        1     1=Zero; 2=Define                                  4      CATCHMENT
18      CONFLUENCE                                                   53.000      ID No.б 99999
        1     Junction Node No.                                    11.340      Area in hectares
        .386       3.338       .422       .000 c.m/s               275.000      Length (PERV) metres
35      COMMENT                                                       1.000      Gradient (%)
        3     line(s) of comment                                     70.000      Per cent Impervious
              *****************                                      275.000      Length (IMPERV)
              REALIGNED CHANNEL - SEGMENT 2                            .000      %Imp. with Zero Dpth
              *****************                                           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
 4      CATCHMENT                                                      .250      Manning "n"
     200.000      ID No.б 99999                                      74.000      SCS Curve No or C
        .970      Area in hectares                                     .100      Ia/S Coefficient
      80.416      Length (PERV) metres                                8.924      Initial Abstraction
       1.000      Gradient (%)                                            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      10.000      Per cent Impervious                                1.171       .000       .649       .649 c.m/s
      80.416      Length (IMPERV)                                      .194        .865       .664    C perv/imperv/total
        .000      %Imp. with Zero Dpth                         15      ADD RUNOFF
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat 1.171      1.171       .649       .649 c.m/s
        .250      Manning "n"                                    9      ROUTE
      74.000      SCS Curve No or C                                    .000      Conduit Length
        .100      Ia/S Coefficient                                     .000      No Conduit defined
       8.924      Initial Abstraction                                  .000      Zero lag
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  .000      Beta weighting factor
        .015       3.338       .422       .000 c.m/s                    .000      Routing timestep
        .194        .858       .261    C perv/imperv/total                0      No. of sub-reaches
35      COMMENT                                                      1.171      1.171      1.171       .649 c.m/s
        3     line(s) of comment                            17      COMBINE
              *****************                                      2     Junction Node No.
              FLOW D/S OF AREA A20 - OUTLET B                       1.171      1.171      1.171      1.820 c.m/s
              *****************                             18      CONFLUENCE
15      ADD RUNOFF                                                    2     Junction Node No.
        .015       3.353       .422       .000 c.m/s               1.171      1.820      1.171       .000 c.m/s
35      COMMENT                                                4      CATCHMENT
        3     line(s) of comment                                   54.000      ID No.б 99999
              ***********************                               1.280      Area in hectares
              EX RES. AND FUT DEVELOPMENT LANDS BY OTHERS WEST OF FIRST AV  92.000      Length (PERV) metres
              ***********************                               1.000      Gradient (%)
 4      CATCHMENT                                                   60.000      Per cent Impervious
      21.000      ID No.б 99999                                      92.000      Length (IMPERV)
      35.460      Area in hectares                                     .000      %Imp. with Zero Dpth
     487.000      Length (PERV) metres                                   1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .200      Gradient (%)                                         .250      Manning "n"
       5.000      Per cent Impervious                                74.000      SCS Curve No or C
     487.000      Length (IMPERV)                                      .100      Ia/S Coefficient
        .000      %Imp. with Zero Dpth                                8.924      Initial Abstraction
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat     1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
        .250      Manning "n"                                          .107      1.820      1.171       .000 c.m/s
      74.000      SCS Curve No or C                                    .194        .857       .592    C perv/imperv/total
        .100      Ia/S Coefficient                             15      ADD RUNOFF
       8.924      Initial Abstraction                                  .107      1.923      1.171       .000 c.m/s
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv 27     HYDROGRAPH DISPLAY
        .181       3.353       .422       .000 c.m/s               5     is # of Hyeto/Hydrograph chosen
15      ADD RUNOFF                                                      Volume  =  .4892284E+04 c.m
        .181       3.489       .422       .000 c.m/s          10      POND
 9      ROUTE                                                         6 Depth - Discharge - Volume sets
        .000      Conduit Length                                   182.000        .000        .0
        .000      No Conduit defined                               182.800       .0190      5251.0
        .000      Zero lag                                         183.150       .0230      7895.0
        .000      Beta weighting factor                            183.500        .238     10751.0
        .000      Routing timestep                                 183.800        .396     13425.0
           0      No. of sub-reaches                               184.000      1.028     15337.0
        .181       3.489       3.489       .000 c.m/s               Peak Outflow  =      .017 c.m/s
                                                                    Maximum Depth  =   182.699 metres
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        Maximum Storage =    4589. c.m
                    .107    1.923    .017     .000 c.m/s
17    COMBINE
      2    Junction Node No.
                    .107    1.923    .017     .017 c.m/s
14    START
      1    1=Zero; 2=Define
35    COMMENT
      3    line(s) of comment
      ************************
      EXISTING AREA ON QUAKER RD, EAST OF RICE RD
      ************************
 4    CATCHMENT
      5.000    ID No.6 99999
      1.870    Area in hectares
    112.000    Length (PERV) metres
      1.000    Gradient (%)
     50.000    Per cent Impervious
    112.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     74.000    SCS Curve No or C
       .100    Ia/S Coefficient
      8.924    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .130    .000    .017    .017 c.m/s
               .194    .851    .522    C perv/imperv/total
15    ADD RUNOFF
               .130    .130    .017    .017 c.m/s
 9    ROUTE
       .000    Conduit Length
       .000    No Conduit defined
       .000    Zero lag
       .000    Beta weighting factor
       .000    Routing timestep
          0    No. of sub-reaches
               .130    .130    .130    .017 c.m/s
17    COMBINE
      2    Junction Node No.
               .130    .130    .130    .136 c.m/s
18    CONFLUENCE
      2    Junction Node No.
               .130    .136    .130    .000 c.m/s
35    COMMENT
      3    line(s) of comment
      ************************
      EXISTING AREA ON QUAKER RD, EAST OF RICE RD
      ************************
 4    CATCHMENT
      6.000    ID No.6 99999
      1.920    Area in hectares
    113.000    Length (PERV) metres
       .200    Gradient (%)
     65.000    Per cent Impervious
    113.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     74.000    SCS Curve No or C
       .100    Ia/S Coefficient
      8.470    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .185    .136    .130    .000 c.m/s
               .194    .867    .631    C perv/imperv/total
15    ADD RUNOFF
               .185    .321    .130    .000 c.m/s
35    COMMENT
      3    line(s) of comment
      ***********
      FIRST AVE FROM QUAKER RD TO CITY OF WELLAND MUNICIPAL BOUNDA
      ***********
 4    CATCHMENT
    201.000    ID No.6 99999
      2.430    Area in hectares
    127.000    Length (PERV) metres
      1.000    Gradient (%)
     65.000    Per cent Impervious
    127.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     74.000    SCS Curve No or C
       .100    Ia/S Coefficient
      8.924    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .221    .321    .130    .000 c.m/s
               .194    .848    .619    C perv/imperv/total
15    ADD RUNOFF
               .221    .542    .130    .000 c.m/s
 9    ROUTE
       .000    Conduit Length
       .000    No Conduit defined
       .000    Zero lag
       .000    Beta weighting factor
       .000    Routing timestep
          0    No. of sub-reaches
               .221    .542    .542    .000 c.m/s
17    COMBINE
      1    Junction Node No.
               .221    .542    .542    4.031 c.m/s
35    COMMENT
      3    line(s) of comment
      ************************
      FLOW D/S OF FIRST AVE CULVERT - OUTLET C
      ************************
18    CONFLUENCE
      1    Junction Node No.
               .221    4.031    .542    .000 c.m/s

35    COMMENT
      3    line(s) of comment
      ***********
      REALIGNED CHANNEL - SEGMENT 3
      ***********
 4    CATCHMENT
    300.000    ID No.6 99999
      3.180    Area in hectares
    146.000    Length (PERV) metres
       .200    Gradient (%)
     15.000    Per cent Impervious
    146.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     74.000    SCS Curve No or C
       .100    Ia/S Coefficient
      8.924    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .071    4.031    .542    .000 c.m/s
               .194    .859    .294    C perv/imperv/total
15    ADD RUNOFF
               .071    4.102    .542    .000 c.m/s
 4    CATCHMENT
    301.000    ID No.6 99999
       .720    Area in hectares
     69.000    Length (PERV) metres
       .200    Gradient (%)
     10.000    Per cent Impervious
     69.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     74.000    SCS Curve No or C
       .100    Ia/S Coefficient
      8.924    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .011    4.102    .542    .000 c.m/s
               .194    .855    .260    C perv/imperv/total
15    ADD RUNOFF
               .011    4.113    .542    .000 c.m/s
 9    ROUTE
       .000    Conduit Length
       .000    No Conduit defined
       .000    Zero lag
       .000    Beta weighting factor
       .000    Routing timestep
          0    No. of sub-reaches
               .011    4.113    4.113    .000 c.m/s
17    COMBINE
      1    Junction Node No.
               .011    4.113    4.113    4.113 c.m/s
14    START
      1    1=Zero; 2=Define
35    COMMENT
      3    line(s) of comment
      ***********
      PROP DEVELOPMENT NORTH OF SEGMENT 3 - POND P30
      ***********
 4    CATCHMENT
     30.000    ID No.6 99999
      8.470    Area in hectares
    238.000    Length (PERV) metres
       .200    Gradient (%)
       .100    Per cent Impervious
    238.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     74.000    SCS Curve No or C
       .100    Ia/S Coefficient
      8.924    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .035    .000    4.113    4.113 c.m/s
               .194    .867    .195    C perv/imperv/total
15    ADD RUNOFF
               .035    .035    4.113    4.113 c.m/s
 4    CATCHMENT
     31.000    ID No.6 99999
     10.420    Area in hectares
    264.000    Length (PERV) metres
      1.000    Gradient (%)
     75.000    Per cent Impervious
    264.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     74.000    SCS Curve No or C
       .100    Ia/S Coefficient
      8.924    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.154    .035    4.113    4.113 c.m/s
               .194    .866    .698    C perv/imperv/total
15    ADD RUNOFF
              1.154    1.158    4.113    4.113 c.m/s
27    HYDROGRAPH DISPLAY
      5    is # of Hyeto/Hydrograph chosen
      Volume  =  .3477034E+04 c.m
 4    CATCHMENT
     32.000    ID No.6 99999
       .690    Area in hectares
     68.000    Length (PERV) metres
      1.000    Gradient (%)
     60.000    Per cent Impervious
     68.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     74.000    SCS Curve No or C
```

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              .100    Ia/S Coefficient                                        .100    Ia/S Coefficient
             8.924    Initial Abstraction                                    8.924    Initial Abstraction
                1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv    1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                 .061    1.158    4.113    4.113 c.m/s                          .024    4.153    .043    .000 c.m/s
                 .194    .857    .592    C perv/imperv/total                    .194    .868    .262    C perv/imperv/total
15    ADD RUNOFF                                               35    COMMENT
                 .061    1.210    4.113    4.113 c.m/s            3    line(s) of comment
27    HYDROGRAPH DISPLAY                                          ****************************
        5    is # of Hyeto/Hydrograph chosen                     FLOW U/S OF NIAGARA ST CULVERT - OUTLET D
        Volume = .3636135E+04 c.m                                ****************************
10    POND                                                  15    ADD RUNOFF
        5 Depth - Discharge - Volume sets                        .024    4.177    .043    .000 c.m/s
        178.800    .000    .0                            14    START
        179.300    .0260    1520.0                          1    1=Zero; 2=Define
        180.100    .0440    4649.0
        180.600    .414    7069.0
        180.800    1.204    8137.0
        Peak Outflow    =    .034 c.m/s
        Maximum Depth    =    179.642 metres
        Maximum Storage =    2856. c.m
                 .061    1.210    .034    4.113 c.m/s
17    COMBINE
        1    Junction Node No.
                 .061    1.210    .034    4.131 c.m/s
14    START
        1    1=Zero; 2=Define
35    COMMENT
        3    line(s) of comment
        ***********
        PROP DEVELOPMENT SOUTH OF SEGMENT 3 - POND P31
        ***********
 4    CATCHMENT
        33.000    ID No.ó 99999
        12.960    Area in hectares
       294.000    Length (PERV) metres
         1.000    Gradient (%)
        75.000    Per cent Impervious
       294.000    Length (IMPERV)
          .000    %Imp. with Zero Dpth
             1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250    Manning "n"
        74.000    SCS Curve No or C
          .100    Ia/S Coefficient
         8.924    Initial Abstraction
             1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.428    .000    .034    4.131 c.m/s
             .194    .863    .696    C perv/imperv/total
15    ADD RUNOFF
             1.428    1.428    .034    4.131 c.m/s
27    HYDROGRAPH DISPLAY
        5    is # of Hyeto/Hydrograph chosen
        Volume = .3513004E+04 c.m
 4    CATCHMENT
        34.000    ID No.ó 99999
          .660    Area in hectares
        66.000    Length (PERV) metres
         1.000    Gradient (%)
        60.000    Per cent Impervious
        66.000    Length (IMPERV)
          .000    %Imp. with Zero Dpth
             1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250    Manning "n"
        74.000    SCS Curve No or C
          .100    Ia/S Coefficient
         8.924    Initial Abstraction
             1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .059    1.428    .034    4.131 c.m/s
             .194    .856    .591    C perv/imperv/total
15    ADD RUNOFF
             .059    1.478    .034    4.131 c.m/s
27    HYDROGRAPH DISPLAY
        5    is # of Hyeto/Hydrograph chosen
        Volume = .3665095E+04 c.m
10    POND
        6 Depth - Discharge - Volume sets
        178.300    .000    .0
        178.900    .0350    1927.0
        179.600    .0540    4692.0
        179.800    .150    5590.0
        180.000    .321    6538.0
        180.300    1.922    8059.0
        Peak Outflow    =    .043 c.m/s
        Maximum Depth    =    179.201 metres
        Maximum Storage =    3116. c.m
             .059    1.478    .043    4.131 c.m/s
17    COMBINE
        1    Junction Node No.
             .059    1.478    .043    4.153 c.m/s
14    START
        1    1=Zero; 2=Define
18    CONFLUENCE
        1    Junction Node No.
             .059    4.153    .043    .000 c.m/s
35    COMMENT
        3    line(s) of comment
        ***********************
        REALIGNED CHANNEL - SEGMENT 3
        ***********************
 4    CATCHMENT
       302.000    ID No.ó 99999
         1.610    Area in hectares
       104.000    Length (PERV) metres
          .200    Gradient (%)
        10.000    Per cent Impervious
       104.000    Length (IMPERV)
          .000    %Imp. with Zero Dpth
             1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250    Manning "n"
        74.000    SCS Curve No or C
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 35    COMMENT
   3    line(s) of comment
       *********************************************************
       5-YEAR STORM EVENT
       *********************************************************
 2     STORM
       1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
 830.000    Coefficient  a
   7.300    Constant   b    (min)
    .777    Exponent   c
    .450    Fraction to peak  r
 240.000    Duration  ó  240 min
  45.874 mm      Total depth
 3     IMPERVIOUS
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .015    Manning "n"
  98.000    SCS Curve No or C
    .100    Ia/S Coefficient
    .518    Initial Abstraction
 35    COMMENT
   3    line(s) of comment
       ******************
       EXISTING RES. WEST OF SEGMENT 1
       ******************
 4     CATCHMENT
   1.000    ID No.ó 99999
  17.520    Area in hectares
 343.000    Length (PERV) metres
   1.000    Gradient (%)
  35.000    Per cent Impervious
 343.000    Length (IMPERV)
    .000    %Imp. with Zero Dpth
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250    Manning "n"
  74.000    SCS Curve No or C
    .100    Ia/S Coefficient
   8.924    Initial Abstraction
       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          1.082      .000      .000      .000 c.m/s
           .236      .879      .461      C perv/imperv/total
 15    ADD RUNOFF
          1.082     1.082      .000      .000 c.m/s
 35    COMMENT
   3    line(s) of comment
       ******************
       REALIGNED CHANNEL - SEGMENT 1
       ******************
 4     CATCHMENT
 100.000    ID No.ó 99999
   2.020    Area in hectares
 116.000    Length (PERV) metres
    .400    Gradient (%)
  15.000    Per cent Impervious
 116.000    Length (IMPERV)
    .000    %Imp. with Zero Dpth
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250    Manning "n"
  74.000    SCS Curve No or C
    .100    Ia/S Coefficient
   8.924    Initial Abstraction
       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .055     1.082      .000      .000 c.m/s
           .236      .874      .332      C perv/imperv/total
 35    COMMENT
   3    line(s) of comment
       ******************
       FLOW AT FUT ROADWAY CULVERT - SEGMENT 1
       ******************
 15    ADD RUNOFF
           .055     1.137      .000      .000 c.m/s
 9     ROUTE
    .000    Conduit Length
    .000    No Conduit defined
    .000    Zero lag
    .000    Beta weighting factor
    .000    Routing timestep
       0    No. of sub-reaches
           .055     1.137     1.137      .000 c.m/s
 17    COMBINE
       1    Junction Node No.
           .055     1.137     1.137     1.137 c.m/s
 14    START
       1    1=Zero; 2=Define
 35    COMMENT
   3    line(s) of comment
       ******************
       PROP DEVELOPMENT NORTH OF SEGMENT 1 - POND P10
       ******************
 4     CATCHMENT
  10.000    ID No.ó 99999
   4.050    Area in hectares
 164.000    Length (PERV) metres
   1.000    Gradient (%)
  70.000    Per cent Impervious
 164.000    Length (IMPERV)
    .000    %Imp. with Zero Dpth
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250    Manning "n"
  74.000    SCS Curve No or C
    .100    Ia/S Coefficient
   8.924    Initial Abstraction
       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .477      .000     1.137     1.137 c.m/s
           .236      .871      .681      C perv/imperv/total
 15    ADD RUNOFF
           .477      .477     1.137     1.137 c.m/s
 4     CATCHMENT
  11.000    ID No.ó 99999
   1.000    Area in hectares
```

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  82.000    Length (PERV) metres
   1.000    Gradient (%)
  10.000    Per cent Impervious
  82.000    Length (IMPERV)
    .000    %Imp. with Zero Dpth
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250    Manning "n"
  74.000    SCS Curve No or C
    .100    Ia/S Coefficient
   8.924    Initial Abstraction
       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .020      .477     1.137     1.137 c.m/s
           .235      .875      .299      C perv/imperv/total
 15    ADD RUNOFF
           .020      .497     1.137     1.137 c.m/s
 10    POND
   6 Depth - Discharge - Volume sets
 184.800      .000         .0
 185.750      .0210       1.0
 186.000      .0230      503.0
 186.250      .0260     1091.0
 186.500      .0280     1765.0
 186.700     1.244     2370.0
 Peak Outflow    =      .026 c.m/s
 Maximum Depth   =   186.226 metres
 Maximum Storage =     1035. c.m
           .020      .497      .026     1.137 c.m/s
 17    COMBINE
       1    Junction Node No.
           .020      .497      .026     1.160 c.m/s
 14    START
       1    1=Zero; 2=Define
 18    CONFLUENCE
       1    Junction Node No.
           .020     1.160      .026      .000 c.m/s
 35    COMMENT
   3    line(s) of comment
       ******************
       REALIGNED CHANNEL - SEGMENT 1
       ******************
 4     CATCHMENT
 101.000    ID No.ó 99999
    .610    Area in hectares
  64.000    Length (PERV) metres
   1.000    Gradient (%)
  10.000    Per cent Impervious
  64.000    Length (IMPERV)
    .000    %Imp. with Zero Dpth
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250    Manning "n"
  74.000    SCS Curve No or C
    .100    Ia/S Coefficient
   8.924    Initial Abstraction
       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .012     1.160      .026      .000 c.m/s
           .235      .873      .299      C perv/imperv/total
 15    ADD RUNOFF
           .012     1.172      .026      .000 c.m/s
 9     ROUTE
    .000    Conduit Length
    .000    No Conduit defined
    .000    Zero lag
    .000    Beta weighting factor
    .000    Routing timestep
       0    No. of sub-reaches
           .012     1.172     1.172      .000 c.m/s
 17    COMBINE
       1    Junction Node No.
           .012     1.172     1.172     1.172 c.m/s
 14    START
       1    1=Zero; 2=Define
 35    COMMENT
   3    line(s) of comment
       ******************
       PROP DEVELOPMENT SOUTH OF SEGMENT 1 - POND P11
       ******************
 4     CATCHMENT
  12.000    ID No.ó 99999
   2.680    Area in hectares
 134.000    Length (PERV) metres
   1.000    Gradient (%)
  35.000    Per cent Impervious
 134.000    Length (IMPERV)
    .000    %Imp. with Zero Dpth
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250    Manning "n"
  74.000    SCS Curve No or C
    .100    Ia/S Coefficient
   8.924    Initial Abstraction
       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .159      .000     1.172     1.172 c.m/s
           .236      .866      .456      C perv/imperv/total
 15    ADD RUNOFF
           .159      .159     1.172     1.172 c.m/s
 4     CATCHMENT
  13.000    ID No.ó 99999
   6.980    Area in hectares
 216.000    Length (PERV) metres
   1.000    Gradient (%)
  70.000    Per cent Impervious
 216.000    Length (IMPERV)
    .000    %Imp. with Zero Dpth
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250    Manning "n"
  74.000    SCS Curve No or C
    .100    Ia/S Coefficient
   8.924    Initial Abstraction
       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .835      .159     1.172     1.172 c.m/s
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                .236        .882        .688       C perv/imperv/total
15    ADD RUNOFF
                .835        .994       1.172       1.172 c.m/s
4     CATCHMENT
     14.000      ID No.ó 99999
       .670      Area in hectares
     67.000      Length (PERV) metres
      1.000      Gradient (%)
     60.000      Per cent Impervious
     67.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .072        .994       1.172       1.172 c.m/s
                .235        .873        .618       C perv/imperv/total
15    ADD RUNOFF
                .072       1.052       1.172       1.172 c.m/s
27    HYDROGRAPH DISPLAY
          5    is # of Hyeto/Hydrograph chosen
     Volume  =  .2954374E+04 c.m
10    POND
     5 Depth - Discharge - Volume sets
     184.800        .000           .0
     185.300       .0140        1142.0
     186.100       .0240        3519.0
     186.500        .287        4978.0
     186.800       1.922        6222.0
     Peak Outflow    =        .020 c.m/s
     Maximum Depth   =    185.805 metres
     Maximum Storage =       2641. c.m
                .072       1.052        .020       1.172 c.m/s
35    COMMENT
          3    line(s) of comment
     *****************
     FLOW U/S OF RICE RD CULVERT - OUTLET A1
     *****************
17    COMBINE
          1    Junction Node No.
                .072       1.052        .020       1.185 c.m/s
14    START
          1    1=Zero; 2=Define
35    COMMENT
          3    line(s) of comment
     ***********************
     PROP DEVELOPMENT SOUTH OF QUAKER RD & WEST OF RICE RD. - PON
     ***********************
4     CATCHMENT
     40.000      ID No.ó 99999
      8.210      Area in hectares
    234.000      Length (PERV) metres
      1.000      Gradient (%)
     25.000      Per cent Impervious
    234.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .361        .000        .020       1.185 c.m/s
                .236        .884        .398       C perv/imperv/total
15    ADD RUNOFF
                .361        .361        .020       1.185 c.m/s
9     ROUTE
       .000      Conduit Length
       .000      No Conduit defined
       .000      Zero lag
       .000      Beta weighting factor
       .000      Routing timestep
          0      No. of sub-reaches
                .361        .361        .361       1.185 c.m/s
17    COMBINE
          2    Junction Node No.
                .361        .361        .361        .361 c.m/s
14    START
          1    1=Zero; 2=Define
4     CATCHMENT
     41.000      ID No.ó 99999
       .690      Area in hectares
     68.000      Length (PERV) metres
      1.000      Gradient (%)
     35.000      Per cent Impervious
     68.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .044        .000        .361        .361 c.m/s
                .236        .873        .459       C perv/imperv/total
15    ADD RUNOFF
                .044        .044        .361        .361 c.m/s
4     CATCHMENT
     42.000      ID No.ó 99999
     12.640      Area in hectares
    290.000      Length (PERV) metres
      1.000      Gradient (%)
     70.000      Per cent Impervious
    290.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"

     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               1.556        .044        .361        .361 c.m/s
                .236        .884        .690       C perv/imperv/total
15    ADD RUNOFF
               1.556       1.594        .361        .361 c.m/s
9     ROUTE
       .000      Conduit Length
       .000      No Conduit defined
       .000      Zero lag
       .000      Beta weighting factor
       .000      Routing timestep
          0      No. of sub-reaches
               1.556       1.594       1.594        .361 c.m/s
17    COMBINE
          2    Junction Node No.
               1.556       1.594       1.594       1.955 c.m/s
14    START
          1    1=Zero; 2=Define
4     CATCHMENT
     43.000      ID No.ó 99999
       .330      Area in hectares
     47.000      Length (PERV) metres
      1.000      Gradient (%)
     35.000      Per cent Impervious
     47.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .022        .000       1.594       1.955 c.m/s
                .236        .875        .460       C perv/imperv/total
15    ADD RUNOFF
                .022        .022       1.594       1.955 c.m/s
4     CATCHMENT
     44.000      ID No.ó 99999
      6.400      Area in hectares
    207.000      Length (PERV) metres
      1.000      Gradient (%)
     70.000      Per cent Impervious
    207.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .765        .022       1.594       1.955 c.m/s
                .236        .880        .687       C perv/imperv/total
15    ADD RUNOFF
                .765        .782       1.594       1.955 c.m/s
9     ROUTE
       .000      Conduit Length
       .000      No Conduit defined
       .000      Zero lag
       .000      Beta weighting factor
       .000      Routing timestep
          0      No. of sub-reaches
                .765        .782        .782       1.955 c.m/s
17    COMBINE
          2    Junction Node No.
                .765        .782        .782       2.737 c.m/s
14    START
          1    1=Zero; 2=Define
18    CONFLUENCE
          2    Junction Node No.
                .765       2.737        .782        .000 c.m/s
4     CATCHMENT
     45.000      ID No.ó 99999
      1.030      Area in hectares
     83.000      Length (PERV) metres
      1.000      Gradient (%)
     60.000      Per cent Impervious
     83.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .107       2.737        .782        .000 c.m/s
                .236        .876        .620       C perv/imperv/total
15    ADD RUNOFF
                .107       2.832        .782        .000 c.m/s
27    HYDROGRAPH DISPLAY
          5    is # of Hyeto/Hydrograph chosen
     Volume  =  .8023741E+04 c.m
10    POND
     6 Depth - Discharge - Volume sets
     186.000        .000           .0
     186.800       .0550        4048.0
     187.300       .0730        7091.0
     187.500        .170        8424.0
     187.800        .257       10552.0
     188.000        .880       12094.0
     Peak Outflow    =        .072 c.m/s
     Maximum Depth   =    187.266 metres
     Maximum Storage =       6887. c.m
                .107       2.832        .072        .000 c.m/s
17    COMBINE
          2    Junction Node No.
                .107       2.832        .072        .072 c.m/s
```

```
14    START
 1    1=Zero; 2=Define
35    COMMENT
 3    line(s) of comment
      ***********************
      EXISTING AREA ON QUAKER RD, WEST OF RICE RD
      ***********************
 4    CATCHMENT
      2.000    ID No.ó 99999
      9.020    Area in hectares
    245.000    Length (PERV) metres
      1.000    Gradient (%)
     40.000    Per cent Impervious
    245.000    Length (IMPERV)
      .000     %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
     74.000    SCS Curve No or C
      .100     Ia/S Coefficient
      8.924    Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .624    .000    .072    .072 c.m/s
              .236    .885    .496    C perv/imperv/total
15    ADD RUNOFF
              .624    .624    .072    .072 c.m/s
 9    ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
       0       No. of sub-reaches
              .624    .624    .624    .072 c.m/s
17    COMBINE
 2    Junction Node No.
              .624    .624    .624    .660 c.m/s
14    START
 1    1=Zero; 2=Define
18    CONFLUENCE
 2    Junction Node No.
              .624    .660    .624    .000 c.m/s
35    COMMENT
 3    line(s) of comment
      ***********************
      EXISTING AREA ON QUAKER RD, WEST OF RICE RD
      ***********************
 4    CATCHMENT
      3.000    ID No.ó 99999
      5.680    Area in hectares
    195.000    Length (PERV) metres
      1.000    Gradient (%)
     40.000    Per cent Impervious
    195.000    Length (IMPERV)
      .000     %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
     74.000    SCS Curve No or C
      .100     Ia/S Coefficient
      8.924    Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .392    .660    .624    .000 c.m/s
              .236    .877    .492    C perv/imperv/total
15    ADD RUNOFF
              .392    1.052    .624    .000 c.m/s
 9    ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
       0       No. of sub-reaches
              .392    1.052    1.052    .000 c.m/s
17    COMBINE
 2    Junction Node No.
              .392    1.052    1.052    1.052 c.m/s
14    START
 1    1=Zero; 2=Define
35    COMMENT
 3    line(s) of comment
      ***********************
      PROP DEVELOPMENT SOUTH OF QUAKER RD, EAST OF RICE RD
      ***********************
 4    CATCHMENT
     50.000    ID No.ó 99999
      3.420    Area in hectares
    151.000    Length (PERV) metres
      1.000    Gradient (%)
     10.000    Per cent Impervious
    151.000    Length (IMPERV)
      .000     %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
     74.000    SCS Curve No or C
      .100     Ia/S Coefficient
      8.924    Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .066    .000    1.052    1.052 c.m/s
              .236    .868    .299    C perv/imperv/total
15    ADD RUNOFF
              .066    .066    1.052    1.052 c.m/s
 4    CATCHMENT
     51.000    ID No.ó 99999
      1.980    Area in hectares
    115.000    Length (PERV) metres
      1.000    Gradient (%)
     10.000    Per cent Impervious
    115.000    Length (IMPERV)
      .000     %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat

              .250    Manning "n"
     74.000    SCS Curve No or C
      .100     Ia/S Coefficient
      8.924    Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .039    .066    1.052    1.052 c.m/s
              .236    .872    .299    C perv/imperv/total
15    ADD RUNOFF
              .039    .104    1.052    1.052 c.m/s
 9    ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
       0       No. of sub-reaches
              .039    .104    .104    1.052 c.m/s
17    COMBINE
 2    Junction Node No.
              .039    .104    .104    1.156 c.m/s
14    START
 1    1=Zero; 2=Define
35    COMMENT
 3    line(s) of comment
      ***********************
      EXISTING AREA WEST OF RICE RD AND SOUTH OF QUAKER ROAD
      ***********************
 4    CATCHMENT
      4.000    ID No.ó 99999
     13.940    Area in hectares
    305.000    Length (PERV) metres
      1.000    Gradient (%)
     40.000    Per cent Impervious
    305.000    Length (IMPERV)
      .000     %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
     74.000    SCS Curve No or C
      .100     Ia/S Coefficient
      8.924    Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .988    .000    1.156 c.m/s
              .236    .883    .495    C perv/imperv/total
15    ADD RUNOFF
              .988    .988    .104    1.156 c.m/s
 9    ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
       0       No. of sub-reaches
              .988    .988    .988    1.156 c.m/s
17    COMBINE
 2    Junction Node No.
              .988    .988    .988    2.144 c.m/s
14    START
 1    1=Zero; 2=Define
18    CONFLUENCE
 2    Junction Node No.
              .988    2.144    .988    .000 c.m/s
35    COMMENT
 3    line(s) of comment
      *****************
      RICE ROAD FROM QUAKER RD TO CITY OF WELLAND MUNICIPAL BOUNDA
      *****************
 4    CATCHMENT
    501.000    ID No.ó 99999
      1.570    Area in hectares
    102.000    Length (PERV) metres
      1.000    Gradient (%)
     70.000    Per cent Impervious
    102.000    Length (IMPERV)
      .000     %Imp. with Zero Dpth
       1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
     74.000    SCS Curve No or C
      .100     Ia/S Coefficient
      8.924    Initial Abstraction
       1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .182    2.144    .988    .000 c.m/s
              .236    .874    .683    C perv/imperv/total
15    ADD RUNOFF
              .182    2.317    .988    .000 c.m/s
 9    ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
       0       No. of sub-reaches
              .182    2.317    2.317    .000 c.m/s
35    COMMENT
 3    line(s) of comment
      *****************
      FLOW D/S OF RICE RD CULVERT - OUTLET A2
      *****************
17    COMBINE
 1    Junction Node No.
              .182    2.317    2.317    3.502 c.m/s
14    START
 1    1=Zero; 2=Define
35    COMMENT
 3    line(s) of comment
      *****************
      PROP DEVELOPMENT SOUTH OF QUAKER RD - QUALLITY CONTROL ONLY
      *****************
 4    CATCHMENT
     20.100    ID No.ó 99999
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      .780     Area in hectares
    72.000     Length (PERV) metres
     1.000     Gradient (%)
    35.000     Per cent Impervious
    72.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      .049      .000     2.317     3.502 c.m/s
      .236      .873      .459    C perv/imperv/total
15    ADD RUNOFF
      .049      .049     2.317     3.502 c.m/s
 4    CATCHMENT
    20.000     ID No.6 99999
     3.210     Area in hectares
   146.000     Length (PERV) metres
     1.000     Gradient (%)
    85.000     Per cent Impervious
   146.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      .452      .049     2.317     3.502 c.m/s
      .236      .866      .772    C perv/imperv/total
15    ADD RUNOFF
      .452      .494     2.317     3.502 c.m/s
 9    ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
         0     No. of sub-reaches
      .452      .494      .494     3.502 c.m/s
17    COMBINE
     1    Junction Node No.
      .452      .494      .494     3.996 c.m/s
14    START
     1    1=Zero; 2=Define
18    CONFLUENCE
     1    Junction Node No.
      .452     3.996      .494      .000 c.m/s
35    COMMENT
     3    line(s) of comment
     *****************
     REALIGNED CHANNEL - SEGMENT 2
     *****************
 4    CATCHMENT
   200.000     ID No.6 99999
      .970     Area in hectares
    80.416     Length (PERV) metres
     1.000     Gradient (%)
    10.000     Per cent Impervious
    80.416     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      .019     3.996      .494      .000 c.m/s
      .236      .875      .299    C perv/imperv/total
35    COMMENT
     3    line(s) of comment
     *****************
     FLOW D/S OF AREA A20 - OUTLET B
     *****************
15    ADD RUNOFF
      .019     4.015      .494      .000 c.m/s
35    COMMENT
     3    line(s) of comment
     ************************
     EX RES. AND FUT DEVELOPMENT LANDS BY OTHERS WEST OF FIRST AV
     ************************
 4    CATCHMENT
    21.000     ID No.6 99999
    35.460     Area in hectares
   487.000     Length (PERV) metres
      .200     Gradient (%)
     5.000     Per cent Impervious
   487.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      .229     4.015      .494      .000 c.m/s
      .236      .884      .268    C perv/imperv/total
15    ADD RUNOFF
      .229     4.202      .494      .000 c.m/s
 9    ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
         0     No. of sub-reaches
      .229     4.202     4.202      .000 c.m/s

35    COMMENT
     3    line(s) of comment
     ************************
     FLOW U/S OF FIRST AVE CULVERT
     ************************
17    COMBINE
     1    Junction Node No.
      .229     4.202     4.202     4.202 c.m/s
14    START
     1    1=Zero; 2=Define
35    COMMENT
     3    line(s) of comment
     ***********
     PROP DEVELOPMENT SOUTH OF QUAKER, EAST OF RICE - POND P50
     ***********
 4    CATCHMENT
    52.000     ID No.6 99999
     6.430     Area in hectares
   207.000     Length (PERV) metres
     1.000     Gradient (%)
    70.000     Per cent Impervious
   207.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      .768      .000     4.202     4.202 c.m/s
      .236      .880      .687    C perv/imperv/total
15    ADD RUNOFF
      .768      .768     4.202     4.202 c.m/s
 9    ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
         0     No. of sub-reaches
      .768      .768      .768     4.202 c.m/s
17    COMBINE
     2    Junction Node No.
      .768      .768      .768      .768 c.m/s
14    START
     1    1=Zero; 2=Define
 4    CATCHMENT
    53.000     ID No.6 99999
    11.340     Area in hectares
   275.000     Length (PERV) metres
     1.000     Gradient (%)
    70.000     Per cent Impervious
   275.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
     1.397      .000      .768      .768 c.m/s
      .236      .886      .691    C perv/imperv/total
15    ADD RUNOFF
     1.397     1.397      .768      .768 c.m/s
 9    ROUTE
      .000     Conduit Length
      .000     No Conduit defined
      .000     Zero lag
      .000     Beta weighting factor
      .000     Routing timestep
         0     No. of sub-reaches
     1.397     1.397     1.397      .768 c.m/s
17    COMBINE
     2    Junction Node No.
     1.397     1.397     1.397     2.165 c.m/s
18    CONFLUENCE
     2    Junction Node No.
     1.397     2.165     1.397      .000 c.m/s
 4    CATCHMENT
    54.000     ID No.6 99999
     1.280     Area in hectares
    92.000     Length (PERV) metres
     1.000     Gradient (%)
    60.000     Per cent Impervious
    92.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    74.000     SCS Curve No or C
      .100     Ia/S Coefficient
     8.924     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      .131     2.165     1.397      .000 c.m/s
      .236      .876      .620    C perv/imperv/total
15    ADD RUNOFF
      .131     2.285     1.397      .000 c.m/s
27    HYDROGRAPH DISPLAY
     5    is # of Hyeto/Hydrograph chosen
     Volume = .5982220E+04 c.m
10    POND
     6 Depth - Discharge - Volume sets
   182.000      .000       .0
   182.800      .0190    5251.0
   183.150      .0230    7895.0
   183.500      .238    10751.0
   183.800      .396    13425.0
   184.000     1.028    15337.0
     Peak Outflow =     .020 c.m/s
     Maximum Depth = 182.848 metres
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        Maximum Storage =     5617. c.m                              35    COMMENT
               .131     2.285      .020      .000 c.m/s                      3    line(s) of comment
17    COMBINE                                                                ***********
      2    Junction Node No.                                                 REALIGNED CHANNEL - SEGMENT 3
               .131     2.285      .020      .020 c.m/s                      ***********
14    START                                                            4    CATCHMENT
      1    1=Zero; 2=Define                                                300.000     ID No.ó 99999
35    COMMENT                                                              3.180     Area in hectares
      3    line(s) of comment                                            146.000     Length (PERV) metres
      ************************                                             .200     Gradient (%)
      EXISTING AREA ON QUAKER RD, EAST OF RICE RD                        15.000     Per cent Impervious
      ************************                                          146.000     Length (IMPERV)
 4    CATCHMENT                                                            .000     %Imp. with Zero Dpth
      5.000     ID No.ó 99999                                               1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      1.870     Area in hectares                                           .250     Manning "n"
    112.000     Length (PERV) metres                                     74.000     SCS Curve No or C
      1.000     Gradient (%)                                               .100     Ia/S Coefficient
     50.000     Per cent Impervious                                      8.924     Initial Abstraction
    112.000     Length (IMPERV)                                             1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .000     %Imp. with Zero Dpth                                        .087     4.834      .632      .000 c.m/s
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat           .236      .880      .332    C perv/imperv/total
       .250     Manning "n"                                          15    ADD RUNOFF
     74.000     SCS Curve No or C                                           .087     4.921      .632      .000 c.m/s
       .100     Ia/S Coefficient                                      4    CATCHMENT
      8.924     Initial Abstraction                                     301.000     ID No.ó 99999
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv    .720     Area in hectares
       .153      .000      .020      .020 c.m/s                        69.000     Length (PERV) metres
       .236      .873      .554    C perv/imperv/total                   .200     Gradient (%)
15    ADD RUNOFF                                                        10.000     Per cent Impervious
       .153      .153      .020      .020 c.m/s                        69.000     Length (IMPERV)
 9    ROUTE                                                               .000     %Imp. with Zero Dpth
       .000     Conduit Length                                             1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .000     No Conduit defined                                        .250     Manning "n"
       .000     Zero lag                                                74.000     SCS Curve No or C
       .000     Beta weighting factor                                    .100     Ia/S Coefficient
       .000     Routing timestep                                        8.924     Initial Abstraction
         0    No. of sub-reaches                                           1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .153      .153      .153      .020 c.m/s                          .014     4.921      .632      .000 c.m/s
17    COMBINE                                                               .236      .869      .299    C perv/imperv/total
      2    Junction Node No.                                          15    ADD RUNOFF
               .153      .153      .153      .160 c.m/s                      .014     4.935      .632      .000 c.m/s
18    CONFLUENCE                                                        9    ROUTE
      2    Junction Node No.                                               .000     Conduit Length
               .153      .160      .153      .000 c.m/s                      .000     No Conduit defined
35    COMMENT                                                               .000     Zero lag
      3    line(s) of comment                                              .000     Beta weighting factor
      ************************                                             .000     Routing timestep
      EXISTING AREA ON QUAKER RD, EAST OF RICE RD                           0    No. of sub-reaches
      ************************                                              .014     4.935     4.935      .000 c.m/s
 4    CATCHMENT                                                       17    COMBINE
      6.000     ID No.ó 99999                                              1    Junction Node No.
      1.920     Area in hectares                                                   .014     4.935     4.935     4.935 c.m/s
    113.000     Length (PERV) metres                                  14    START
       .200     Gradient (%)                                               1    1=Zero; 2=Define
     65.000     Per cent Impervious                                  35    COMMENT
    113.000     Length (IMPERV)                                            3    line(s) of comment
       .000     %Imp. with Zero Dpth                                       ***********
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat         PROP DEVELOPMENT NORTH OF SEGMENT 3 - POND P30
       .250     Manning "n"                                                ***********
     74.000     SCS Curve No or C                                     4    CATCHMENT
       .100     Ia/S Coefficient                                        30.000     ID No.ó 99999
      8.470     Initial Abstraction                                     8.470     Area in hectares
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv 238.000     Length (PERV) metres
       .214      .160      .153      .000 c.m/s                          .200     Gradient (%)
       .236      .886      .658    C perv/imperv/total                 .100     Per cent Impervious
15    ADD RUNOFF                                                       238.000     Length (IMPERV)
       .214      .374      .153      .000 c.m/s                          .000     %Imp. with Zero Dpth
35    COMMENT                                                               1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      3    line(s) of comment                                              .250     Manning "n"
      ***********                                                       74.000     SCS Curve No or C
      FIRST AVE FROM QUAKER RD TO CITY OF WELLAND MUNICIPAL BOUNDA       .100     Ia/S Coefficient
      ***********                                                       8.924     Initial Abstraction
 4    CATCHMENT                                                             1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
    201.000     ID No.ó 99999                                             .057      .000     4.935     4.935 c.m/s
      2.430     Area in hectares                                          .236      .885      .236    C perv/imperv/total
    127.000     Length (PERV) metres                                 15    ADD RUNOFF
      1.000     Gradient (%)                                              .057      .057     4.935     4.935 c.m/s
     65.000     Per cent Impervious                                   4    CATCHMENT
    127.000     Length (IMPERV)                                         31.000     ID No.ó 99999
       .000     %Imp. with Zero Dpth                                   10.420     Area in hectares
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat      264.000     Length (PERV) metres
       .250     Manning "n"                                             1.000     Gradient (%)
     74.000     SCS Curve No or C                                      75.000     Per cent Impervious
       .100     Ia/S Coefficient                                      264.000     Length (IMPERV)
      8.924     Initial Abstraction                                      .000     %Imp. with Zero Dpth
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv    1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .259      .374      .153      .000 c.m/s                          .250     Manning "n"
       .236      .868      .647    C perv/imperv/total                 74.000     SCS Curve No or C
15    ADD RUNOFF                                                         .100     Ia/S Coefficient
       .259      .632      .153      .000 c.m/s                        8.924     Initial Abstraction
 9    ROUTE                                                                 1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .000     Conduit Length                                           1.333      .057     4.935     4.935 c.m/s
       .000     No Conduit defined                                       .236      .886      .723    C perv/imperv/total
       .000     Zero lag                                             15    ADD RUNOFF
       .000     Beta weighting factor                                    1.333     1.341     4.935     4.935 c.m/s
       .000     Routing timestep                                    27    HYDROGRAPH DISPLAY
         0    No. of sub-reaches                                          5    is # of Hyeto/Hydrograph chosen
       .259      .632      .632      .000 c.m/s                           Volume =  .4376407E+04 c.m
17    COMBINE                                                          4    CATCHMENT
      1    Junction Node No.                                           32.000     ID No.ó 99999
               .259      .632      .632     4.834 c.m/s                  .690     Area in hectares
35    COMMENT                                                          68.000     Length (PERV) metres
      3    line(s) of comment                                          1.000     Gradient (%)
      ************************                                        60.000     Per cent Impervious
      FLOW D/S OF FIRST AVE CULVERT - OUTLET C                         68.000     Length (IMPERV)
      ************************                                           .000     %Imp. with Zero Dpth
18    CONFLUENCE                                                           1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      1    Junction Node No.                                             .250     Manning "n"
               .259     4.834      .632      .000 c.m/s                74.000     SCS Curve No or C
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            .100      Ia/S Coefficient                                          .100      Ia/S Coefficient
           8.924      Initial Abstraction                                      8.924      Initial Abstraction
              1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv     1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .074      1.341      4.935      4.935 c.m/s                          .030      4.986       .048       .000 c.m/s
               .236       .873       .618     C perv/imperv/total                  .236       .884       .301     C perv/imperv/total
15       ADD RUNOFF                                                    35       COMMENT
               .074      1.401      4.935      4.935 c.m/s                  3       line(s) of comment
27       HYDROGRAPH DISPLAY                                                    ***************************
          5       is # of Hyeto/Hydrograph chosen                             FLOW U/S OF NIAGARA ST CULVERT - OUTLET D
          Volume  =  .4571937E+04 c.m                                         ***************************
10       POND                                                          15       ADD RUNOFF
          5 Depth - Discharge - Volume sets                                            .030      5.016       .048       .000 c.m/s
           178.800       .000        .0                               14       START
           179.300      .0260     1520.0                                      1       1=Zero; 2=Define
           180.100      .0440     4649.0
           180.600      .414      7069.0
           180.800     1.204      8137.0
          Peak Outflow     =      .038 c.m/s
          Maximum Depth    =   179.851 metres
          Maximum Storage  =     3675. c.m
               .074      1.401       .038      4.935 c.m/s
17       COMBINE
          1       Junction Node No.
               .074      1.401       .038      4.958 c.m/s
14       START
          1       1=Zero; 2=Define
35       COMMENT
          3       line(s) of comment
          ***********
          PROP DEVELOPMENT SOUTH OF SEGMENT 3 - POND P31
          ***********
 4       CATCHMENT
          33.000      ID No.ó 99999
          12.960      Area in hectares
         294.000      Length (PERV) metres
           1.000      Gradient (%)
          75.000      Per cent Impervious
         294.000      Length (IMPERV)
            .000      %Imp. with Zero Dpth
              1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
            .250      Manning "n"
          74.000      SCS Curve No or C
            .100      Ia/S Coefficient
           8.924      Initial Abstraction
              1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.708       .000       .038      4.958 c.m/s
               .236       .884       .722     C perv/imperv/total
15       ADD RUNOFF
              1.708      1.708       .038      4.958 c.m/s
27       HYDROGRAPH DISPLAY
          5       is # of Hyeto/Hydrograph chosen
          Volume  =  .4291300E+04 c.m
 4       CATCHMENT
          34.000      ID No.ó 99999
            .660      Area in hectares
          66.000      Length (PERV) metres
           1.000      Gradient (%)
          60.000      Per cent Impervious
          66.000      Length (IMPERV)
            .000      %Imp. with Zero Dpth
              1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
            .250      Manning "n"
          74.000      SCS Curve No or C
            .100      Ia/S Coefficient
           8.924      Initial Abstraction
              1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .072      1.708       .038      4.958 c.m/s
               .235       .873       .618     C perv/imperv/total
15       ADD RUNOFF
               .072      1.765       .038      4.958 c.m/s
27       HYDROGRAPH DISPLAY
          5       is # of Hyeto/Hydrograph chosen
          Volume  =  .4478340E+04 c.m
10       POND
          6 Depth - Discharge - Volume sets
           178.300       .000        .0
           178.900      .0350     1927.0
           179.600      .0540     4692.0
           179.800      .150      5590.0
           180.000      .321      6538.0
           180.300     1.922      8059.0
          Peak Outflow     =      .048 c.m/s
          Maximum Depth    =   179.388 metres
          Maximum Storage  =     3856. c.m
               .072      1.765       .048      4.958 c.m/s
17       COMBINE
          1       Junction Node No.
               .072      1.765       .048      4.986 c.m/s
14       START
          1       1=Zero; 2=Define
18       CONFLUENCE
          1       Junction Node No.
               .072      4.986       .048       .000 c.m/s
35       COMMENT
          3       line(s) of comment
          ***********************
          REALIGNED CHANNEL - SEGMENT 3
          ***********************
 4       CATCHMENT
         302.000      ID No.ó 99999
           1.610      Area in hectares
         104.000      Length (PERV) metres
            .200      Gradient (%)
          10.000      Per cent Impervious
         104.000      Length (IMPERV)
            .000      %Imp. with Zero Dpth
              1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
            .250      Manning "n"
          74.000      SCS Curve No or C
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 35    COMMENT                                              82.000    Length (PERV) metres
    3    line(s) of comment                               1.000    Gradient (%)
     *****************************************************  10.000    Per cent Impervious
     10-YEAR STORM EVENT                                   82.000    Length (IMPERV)
     *****************************************************   .000    %Imp. with Zero Dpth
  2    STORM                                                    1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic      .250    Manning "n"
 860.000    Coefficient  a                                74.000    SCS Curve No or C
   6.500    Constant  b     (min)                           .100    Ia/S Coefficient
    .763    Exponent  c                                    8.924    Initial Abstraction
    .450    Fraction to peak  r                                 1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
 240.000    Duration б  240 min                                .024     .531     1.290     1.290 c.m/s
          51.471 mm     Total depth                             .267     .886     .329    C perv/imperv/total
  3    IMPERVIOUS                                       15    ADD RUNOFF
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat   .024     .555     1.290     1.290 c.m/s
    .015    Manning "n"                               10    POND
  98.000    SCS Curve No or C                             6 Depth - Discharge - Volume sets
    .100    Ia/S Coefficient                          184.800      .000         .0
    .518    Initial Abstraction                       185.750      .0210        1.0
 35    COMMENT                                         186.000      .0230      503.0
    3    line(s) of comment                            186.250      .0260     1091.0
     *******************                               186.500      .0280     1765.0
     EXISTING RES. WEST OF SEGMENT 1                   186.700     1.244     2370.0
     *******************                               Peak Outflow   =      .026 c.m/s
  4    CATCHMENT                                        Maximum Depth  =   186.301 metres
   1.000    ID No.б 99999                               Maximum Storage =    1229. c.m
  17.520    Area in hectares                                 .024     .555     .026     1.290 c.m/s
 343.000    Length (PERV) metres                     17    COMBINE
   1.000    Gradient (%)                                   1    Junction Node No.
  35.000    Per cent Impervious                             .024     .555     .026     1.313 c.m/s
 343.000    Length (IMPERV)                          14    START
    .000    %Imp. with Zero Dpth                           1    1=Zero; 2=Define
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  18    CONFLUENCE
    .250    Manning "n"                                    1    Junction Node No.
  74.000    SCS Curve No or C                               .024     1.313     .026     .000 c.m/s
    .100    Ia/S Coefficient                         35    COMMENT
   8.924    Initial Abstraction                            3    line(s) of comment
       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv    *****************
     1.227     .000     .000     .000 c.m/s                REALIGNED CHANNEL - SEGMENT 1
      .267     .892     .486    C perv/imperv/total         *****************
 15    ADD RUNOFF                                       4    CATCHMENT
     1.227     1.227     .000     .000 c.m/s          101.000    ID No.б 99999
 35    COMMENT                                           .610    Area in hectares
    3    line(s) of comment                            64.000    Length (PERV) metres
     ******************                                 1.000    Gradient (%)
     REALIGNED CHANNEL - SEGMENT 1                     10.000    Per cent Impervious
     ******************                                64.000    Length (IMPERV)
  4    CATCHMENT                                          .000    %Imp. with Zero Dpth
 100.000    ID No.б 99999                                    1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   2.020    Area in hectares                              .250    Manning "n"
 116.000    Length (PERV) metres                        74.000    SCS Curve No or C
    .400    Gradient (%)                                   .100    Ia/S Coefficient
  15.000    Per cent Impervious                          8.924    Initial Abstraction
 116.000    Length (IMPERV)                                  1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
    .000    %Imp. with Zero Dpth                           .016     1.313     .026     .000 c.m/s
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat   .266     .884     .328    C perv/imperv/total
    .250    Manning "n"                               15    ADD RUNOFF
  74.000    SCS Curve No or C                               .016     1.329     .026     .000 c.m/s
    .100    Ia/S Coefficient                          9    ROUTE
   8.924    Initial Abstraction                            .000    Conduit Length
       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv   .000    No Conduit defined
      .063     1.227     .000     .000 c.m/s              .000    Zero lag
      .267     .883     .359    C perv/imperv/total        .000    Beta weighting factor
 35    COMMENT                                            .000    Routing timestep
    3    line(s) of comment                                 0    No. of sub-reaches
     ******************                                     .016     1.329     1.329     .000 c.m/s
     FLOW AT FUT ROADWAY CULVERT - SEGMENT 1          17    COMBINE
     ******************                                     1    Junction Node No.
 15    ADD RUNOFF                                            .016     1.329     1.329     1.329 c.m/s
      .063     1.290     .000     .000 c.m/s          14    START
  9    ROUTE                                                1    1=Zero; 2=Define
    .000    Conduit Length                           35    COMMENT
    .000    No Conduit defined                             3    line(s) of comment
    .000    Zero lag                                       ******************
    .000    Beta weighting factor                          PROP DEVELOPMENT SOUTH OF SEGMENT 1 - POND P11
    .000    Routing timestep                               ******************
       0    No. of sub-reaches                        4    CATCHMENT
      .063     1.290     1.290     .000 c.m/s          12.000    ID No.б 99999
 17    COMBINE                                           2.680    Area in hectares
    1    Junction Node No.                            134.000    Length (PERV) metres
      .063     1.290     1.290     1.290 c.m/s          1.000    Gradient (%)
 14    START                                           35.000    Per cent Impervious
    1    1=Zero; 2=Define                             134.000    Length (IMPERV)
 35    COMMENT                                            .000    %Imp. with Zero Dpth
    3    line(s) of comment                                 1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     ******************                                 .250    Manning "n"
     PROP DEVELOPMENT NORTH OF SEGMENT 1 - POND P10    74.000    SCS Curve No or C
     ******************                                 .100    Ia/S Coefficient
  4    CATCHMENT                                        8.924    Initial Abstraction
  10.000    ID No.б 99999                                   1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
   4.050    Area in hectares                              .178     .000     1.329     1.329 c.m/s
 164.000    Length (PERV) metres                          .267     .880     .481    C perv/imperv/total
   1.000    Gradient (%)                              15    ADD RUNOFF
  70.000    Per cent Impervious                            .178     .178     1.329     1.329 c.m/s
 164.000    Length (IMPERV)                           4    CATCHMENT
    .000    %Imp. with Zero Dpth                      13.000    ID No.б 99999
       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat   6.980    Area in hectares
    .250    Manning "n"                               216.000    Length (PERV) metres
  74.000    SCS Curve No or C                            1.000    Gradient (%)
    .100    Ia/S Coefficient                           70.000    Per cent Impervious
   8.924    Initial Abstraction                       216.000    Length (IMPERV)
       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv   .000    %Imp. with Zero Dpth
      .531     .000     1.290     1.290 c.m/s                1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .267     .879     .695    C perv/imperv/total        .250    Manning "n"
 15    ADD RUNOFF                                       74.000    SCS Curve No or C
      .531     .531     1.290     1.290 c.m/s             .100    Ia/S Coefficient
  4    CATCHMENT                                        8.924    Initial Abstraction
  11.000    ID No.б 99999                                   1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
   1.000    Area in hectares                              .933     .178     1.329     1.329 c.m/s
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                  .267        .890        .703      C perv/imperv/total
15    ADD RUNOFF
                  .933       1.112       1.329       1.329 c.m/s
 4    CATCHMENT
      14.000       ID No.ó 99999
       .670        Area in hectares
      67.000       Length (PERV) metres
       1.000       Gradient (%)
      60.000       Per cent Impervious
      67.000       Length (IMPERV)
       .000        %Imp. with Zero Dpth
           1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250        Manning "n"
      74.000       SCS Curve No or C
       .100        Ia/S Coefficient
      8.924        Initial Abstraction
           1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                  .083       1.112       1.329       1.329 c.m/s
                  .267        .884        .637      C perv/imperv/total
15    ADD RUNOFF
                  .083       1.177       1.329       1.329 c.m/s
27    HYDROGRAPH DISPLAY
           5    is # of Hyeto/Hydrograph chosen
      Volume  = .3408792E+04 c.m
10    POND
       5 Depth - Discharge - Volume sets
      184.800       .000         .0
      185.300       .0140      1142.0
      186.100       .0240      3519.0
      186.500       .287       4978.0
      186.800      1.922       6222.0
      Peak Outflow   =      .022 c.m/s
      Maximum Depth  =   185.947 metres
      Maximum Storage =     3066. c.m
                  .083       1.177        .022       1.329 c.m/s
35    COMMENT
       3    line(s) of comment
       *****************
       FLOW U/S OF RICE RD CULVERT - OUTLET A1
       *****************
17    COMBINE
       1    Junction Node No.
                  .083       1.177        .022       1.344 c.m/s
14    START
       1    1=Zero; 2=Define
35    COMMENT
       3    line(s) of comment
       ***********************
       PROP DEVELOPMENT SOUTH OF QUAKER RD & WEST OF RICE RD. - PON
       ***********************
 4    CATCHMENT
      40.000       ID No.ó 99999
      8.210        Area in hectares
      234.000      Length (PERV) metres
       1.000       Gradient (%)
      25.000       Per cent Impervious
      234.000      Length (IMPERV)
       .000        %Imp. with Zero Dpth
           1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250        Manning "n"
      74.000       SCS Curve No or C
       .100        Ia/S Coefficient
      8.924        Initial Abstraction
           1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                  .408        .000        .022       1.344 c.m/s
                  .267        .894        .423      C perv/imperv/total
15    ADD RUNOFF
                  .408        .408        .022       1.344 c.m/s
 9    ROUTE
       .000        Conduit Length
       .000        No Conduit defined
       .000        Zero lag
       .000        Beta weighting factor
       .000        Routing timestep
           0       No. of sub-reaches
                  .408        .408        .408       1.344 c.m/s
17    COMBINE
       2    Junction Node No.
                  .408        .408        .408        .408 c.m/s
14    START
       1    1=Zero; 2=Define
 4    CATCHMENT
      41.000       ID No.ó 99999
       .690        Area in hectares
      68.000       Length (PERV) metres
       1.000       Gradient (%)
      35.000       Per cent Impervious
      68.000       Length (IMPERV)
       .000        %Imp. with Zero Dpth
           1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250        Manning "n"
      74.000       SCS Curve No or C
       .100        Ia/S Coefficient
      8.924        Initial Abstraction
           1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                  .051        .000        .408        .408 c.m/s
                  .267        .884        .483      C perv/imperv/total
15    ADD RUNOFF
                  .051        .051        .408        .408 c.m/s
 4    CATCHMENT
      42.000       ID No.ó 99999
      12.640       Area in hectares
      290.000      Length (PERV) metres
       1.000       Gradient (%)
      70.000       Per cent Impervious
      290.000      Length (IMPERV)
       .000        %Imp. with Zero Dpth
           1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250        Manning "n"
```
```
      74.000       SCS Curve No or C
       .100        Ia/S Coefficient
      8.924        Initial Abstraction
           1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                  1.695        .051        .408        .408 c.m/s
                  .267        .897        .708      C perv/imperv/total
15    ADD RUNOFF
                  1.695       1.737        .408        .408 c.m/s
 9    ROUTE
       .000        Conduit Length
       .000        No Conduit defined
       .000        Zero lag
       .000        Beta weighting factor
       .000        Routing timestep
           0       No. of sub-reaches
                  1.695       1.737       1.737        .408 c.m/s
17    COMBINE
       2    Junction Node No.
                  1.695       1.737       1.737       2.145 c.m/s
14    START
       1    1=Zero; 2=Define
 4    CATCHMENT
      43.000       ID No.ó 99999
       .330        Area in hectares
      47.000       Length (PERV) metres
       1.000       Gradient (%)
      35.000       Per cent Impervious
      47.000       Length (IMPERV)
       .000        %Imp. with Zero Dpth
           1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250        Manning "n"
      74.000       SCS Curve No or C
       .100        Ia/S Coefficient
      8.924        Initial Abstraction
           1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                  .026        .000       1.737       2.145 c.m/s
                  .266        .885        .483      C perv/imperv/total
15    ADD RUNOFF
                  .026        .026       1.737       2.145 c.m/s
 4    CATCHMENT
      44.000       ID No.ó 99999
      6.400        Area in hectares
      207.000      Length (PERV) metres
       1.000       Gradient (%)
      70.000       Per cent Impervious
      207.000      Length (IMPERV)
       .000        %Imp. with Zero Dpth
           1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250        Manning "n"
      74.000       SCS Curve No or C
       .100        Ia/S Coefficient
      8.924        Initial Abstraction
           1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                  .854        .026       1.737       2.145 c.m/s
                  .267        .887        .701      C perv/imperv/total
15    ADD RUNOFF
                  .854        .874       1.737       2.145 c.m/s
 9    ROUTE
       .000        Conduit Length
       .000        No Conduit defined
       .000        Zero lag
       .000        Beta weighting factor
       .000        Routing timestep
           0       No. of sub-reaches
                  .854        .874        .874       2.145 c.m/s
17    COMBINE
       2    Junction Node No.
                  .854        .874        .874       3.019 c.m/s
14    START
       1    1=Zero; 2=Define
18    CONFLUENCE
       2    Junction Node No.
                  .854       3.019        .874        .000 c.m/s
 4    CATCHMENT
      45.000       ID No.ó 99999
      1.030        Area in hectares
      83.000       Length (PERV) metres
       1.000       Gradient (%)
      60.000       Per cent Impervious
      83.000       Length (IMPERV)
       .000        %Imp. with Zero Dpth
           1       Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250        Manning "n"
      74.000       SCS Curve No or C
       .100        Ia/S Coefficient
      8.924        Initial Abstraction
           1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                  .122       3.019        .874        .000 c.m/s
                  .267        .886        .638      C perv/imperv/total
15    ADD RUNOFF
                  .122       3.124        .874        .000 c.m/s
27    HYDROGRAPH DISPLAY
           5    is # of Hyeto/Hydrograph chosen
      Volume  = .9292279E+04 c.m
10    POND
       6 Depth - Discharge - Volume sets
      186.000       .000         .0
      186.800       .0550      4048.0
      187.300       .0730      7091.0
      187.500       .170       8424.0
      187.800       .257      10552.0
      188.000       .880      12094.0
      Peak Outflow   =      .129 c.m/s
      Maximum Depth  =   187.415 metres
      Maximum Storage =     7854. c.m
                  .122       3.124        .129        .000 c.m/s
17    COMBINE
       2    Junction Node No.
                  .122       3.124        .129        .129 c.m/s
```

```
14     START
 1     1=Zero; 2=Define
35     COMMENT
 3     line(s) of comment
       ***********************
       EXISTING AREA ON QUAKER RD, WEST OF RICE RD
       ***********************
 4     CATCHMENT
 2.000     ID No.ó 99999
 9.020     Area in hectares
245.000    Length (PERV) metres
 1.000     Gradient (%)
40.000     Per cent Impervious
245.000    Length (IMPERV)
 .000      %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
 .250      Manning "n"
74.000     SCS Curve No or C
 .100      Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .702      .000      .129      .129 c.m/s
       .267      .895      .518      C perv/imperv/total
15     ADD RUNOFF
       .702      .702      .129      .129 c.m/s
 9     ROUTE
 .000      Conduit Length
 .000      No Conduit defined
 .000      Zero lag
 .000      Beta weighting factor
 .000      Routing timestep
 0     No. of sub-reaches
       .702      .702      .702      .129 c.m/s
17     COMBINE
 2     Junction Node No.
       .702      .702      .702      .745 c.m/s
14     START
 1     1=Zero; 2=Define
18     CONFLUENCE
 2     Junction Node No.
       .702      .745      .702      .000 c.m/s
35     COMMENT
 3     line(s) of comment
       ***********************
       EXISTING AREA ON QUAKER RD, WEST OF RICE RD
       ***********************
 4     CATCHMENT
 3.000     ID No.ó 99999
 5.680     Area in hectares
195.000    Length (PERV) metres
 1.000     Gradient (%)
40.000     Per cent Impervious
195.000    Length (IMPERV)
 .000      %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
 .250      Manning "n"
74.000     SCS Curve No or C
 .100      Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .440      .745      .702      .000 c.m/s
       .267      .885      .514      C perv/imperv/total
15     ADD RUNOFF
       .440      1.185     .702      .000 c.m/s
 9     ROUTE
 .000      Conduit Length
 .000      No Conduit defined
 .000      Zero lag
 .000      Beta weighting factor
 .000      Routing timestep
 0     No. of sub-reaches
       .440      1.185     1.185     .000 c.m/s
17     COMBINE
 2     Junction Node No.
       .440      1.185     1.185     1.185 c.m/s
14     START
 1     1=Zero; 2=Define
35     COMMENT
 3     line(s) of comment
       ***********************
       PROP DEVELOPMENT SOUTH OF QUAKER RD, EAST OF RICE RD
       ***********************
 4     CATCHMENT
50.000     ID No.ó 99999
 3.420     Area in hectares
151.000    Length (PERV) metres
 1.000     Gradient (%)
10.000     Per cent Impervious
151.000    Length (IMPERV)
 .000      %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
 .250      Manning "n"
74.000     SCS Curve No or C
 .100      Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .077      .000      1.185     1.185 c.m/s
       .267      .875      .328      C perv/imperv/total
15     ADD RUNOFF
       .077      .077      1.185     1.185 c.m/s
 4     CATCHMENT
51.000     ID No.ó 99999
 1.980     Area in hectares
115.000    Length (PERV) metres
 1.000     Gradient (%)
10.000     Per cent Impervious
115.000    Length (IMPERV)
 .000      %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
```

```
       .250      Manning "n"
74.000     SCS Curve No or C
 .100      Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .046      .077      1.185     1.185 c.m/s
       .267      .885      .328      C perv/imperv/total
15     ADD RUNOFF
       .046      .123      1.185     1.185 c.m/s
 9     ROUTE
 .000      Conduit Length
 .000      No Conduit defined
 .000      Zero lag
 .000      Beta weighting factor
 .000      Routing timestep
 0     No. of sub-reaches
       .046      .123      .123      1.185 c.m/s
17     COMBINE
 2     Junction Node No.
       .046      .123      .123      1.308 c.m/s
14     START
 1     1=Zero; 2=Define
35     COMMENT
 3     line(s) of comment
       ***********************
       EXISTING AREA WEST OF RICE RD AND SOUTH OF QUAKER ROAD
       ***********************
 4     CATCHMENT
 4.000     ID No.ó 99999
13.940     Area in hectares
305.000    Length (PERV) metres
 1.000     Gradient (%)
40.000     Per cent Impervious
305.000    Length (IMPERV)
 .000      %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
 .250      Manning "n"
74.000     SCS Curve No or C
 .100      Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       1.115     .000      .123      1.308 c.m/s
       .267      .896      .518      C perv/imperv/total
15     ADD RUNOFF
       1.115     1.115     .123      1.308 c.m/s
 9     ROUTE
 .000      Conduit Length
 .000      No Conduit defined
 .000      Zero lag
 .000      Beta weighting factor
 .000      Routing timestep
 0     No. of sub-reaches
       1.115     1.115     1.115     1.308 c.m/s
17     COMBINE
 2     Junction Node No.
       1.115     1.115     1.115     2.423 c.m/s
14     START
 1     1=Zero; 2=Define
18     CONFLUENCE
 2     Junction Node No.
       1.115     2.423     1.115     .000 c.m/s
35     COMMENT
 3     line(s) of comment
       ******************
       RICE ROAD FROM QUAKER RD TO CITY OF WELLAND MUNICIPAL BOUNDA
       ******************
 4     CATCHMENT
501.000    ID No.ó 99999
 1.570     Area in hectares
102.000    Length (PERV) metres
 1.000     Gradient (%)
70.000     Per cent Impervious
102.000    Length (IMPERV)
 .000      %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
 .250      Manning "n"
74.000     SCS Curve No or C
 .100      Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       .209      2.423     1.115     .000 c.m/s
       .267      .886      .700      C perv/imperv/total
15     ADD RUNOFF
       .209      2.615     1.115     .000 c.m/s
 9     ROUTE
 .000      Conduit Length
 .000      No Conduit defined
 .000      Zero lag
 .000      Beta weighting factor
 .000      Routing timestep
 0     No. of sub-reaches
       .209      2.615     2.615     .000 c.m/s
35     COMMENT
 3     line(s) of comment
       ******************
       FLOW D/S OF RICE RD CULVERT - OUTLET A2
       ******************
17     COMBINE
 1     Junction Node No.
       .209      2.615     2.615     3.959 c.m/s
14     START
 1     1=Zero; 2=Define
35     COMMENT
 3     line(s) of comment
       ******************
       PROP DEVELOPMENT SOUTH OF QUAKER RD - QUALLITY CONTROL ONLY
       ******************
 4     CATCHMENT
20.100     ID No.ó 99999
```

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     .780      Area in hectares
   72.000      Length (PERV) metres
    1.000      Gradient (%)
   35.000      Per cent Impervious
   72.000      Length (IMPERV)
     .000      %Imp. with Zero Dpth
        1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250      Manning "n"
   74.000      SCS Curve No or C
     .100      Ia/S Coefficient
    8.924      Initial Abstraction
        1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .057      .000     2.615     3.959 c.m/s
          .267      .884      .483   C perv/imperv/total
15    ADD RUNOFF
          .057      .057     2.615     3.959 c.m/s
 4    CATCHMENT
   20.000      ID No.ó 99999
    3.210      Area in hectares
  146.000      Length (PERV) metres
    1.000      Gradient (%)
   85.000      Per cent Impervious
  146.000      Length (IMPERV)
     .000      %Imp. with Zero Dpth
        1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250      Manning "n"
   74.000      SCS Curve No or C
     .100      Ia/S Coefficient
    8.924      Initial Abstraction
        1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .500      .057     2.615     3.959 c.m/s
          .267      .877      .785   C perv/imperv/total
15    ADD RUNOFF
          .500      .549     2.615     3.959 c.m/s
 9    ROUTE
     .000      Conduit Length
     .000      No Conduit defined
     .000      Zero lag
     .000      Beta weighting factor
     .000      Routing timestep
        0      No. of sub-reaches
          .500      .549      .549     3.959 c.m/s
17    COMBINE
    1      Junction Node No.
          .500      .549      .549     4.508 c.m/s
14    START
    1      1=Zero; 2=Define
18    CONFLUENCE
    1      Junction Node No.
          .500     4.508      .549      .000 c.m/s
35    COMMENT
    3      line(s) of comment
       *****************
       REALIGNED CHANNEL - SEGMENT 2
       *****************
 4    CATCHMENT
  200.000      ID No.ó 99999
     .970      Area in hectares
   80.416      Length (PERV) metres
    1.000      Gradient (%)
   10.000      Per cent Impervious
   80.416      Length (IMPERV)
     .000      %Imp. with Zero Dpth
        1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250      Manning "n"
   74.000      SCS Curve No or C
     .100      Ia/S Coefficient
    8.924      Initial Abstraction
        1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .024     4.508      .549      .000 c.m/s
          .267      .886      .328   C perv/imperv/total
35    COMMENT
    3      line(s) of comment
       *****************
       FLOW D/S OF AREA A20 - OUTLET B
       *****************
15    ADD RUNOFF
          .024     4.532      .549      .000 c.m/s
35    COMMENT
    3      line(s) of comment
       ************************
       EX RES. AND FUT DEVELOPMENT LANDS BY OTHERS WEST OF FIRST AV
       ************************
 4    CATCHMENT
   21.000      ID No.ó 99999
   35.460      Area in hectares
  487.000      Length (PERV) metres
     .200      Gradient (%)
    5.000      Per cent Impervious
  487.000      Length (IMPERV)
     .000      %Imp. with Zero Dpth
        1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250      Manning "n"
   74.000      SCS Curve No or C
     .100      Ia/S Coefficient
    8.924      Initial Abstraction
        1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .269     4.532      .549      .000 c.m/s
          .267      .897      .298   C perv/imperv/total
15    ADD RUNOFF
          .269     4.762      .549      .000 c.m/s
 9    ROUTE
     .000      Conduit Length
     .000      No Conduit defined
     .000      Zero lag
     .000      Beta weighting factor
     .000      Routing timestep
        0      No. of sub-reaches
          .269     4.762     4.762      .000 c.m/s
```

```
35    COMMENT
    3      line(s) of comment
       ************************
       FLOW U/S OF FIRST AVE CULVERT
       ************************
17    COMBINE
    1      Junction Node No.
          .269     4.762     4.762     4.762 c.m/s
14    START
    1      1=Zero; 2=Define
35    COMMENT
    3      line(s) of comment
       ***********
       PROP DEVELOPMENT SOUTH OF QUAKER, EAST OF RICE - POND P50
       ***********
 4    CATCHMENT
   52.000      ID No.ó 99999
    6.430      Area in hectares
  207.000      Length (PERV) metres
    1.000      Gradient (%)
   70.000      Per cent Impervious
  207.000      Length (IMPERV)
     .000      %Imp. with Zero Dpth
        1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250      Manning "n"
   74.000      SCS Curve No or C
     .100      Ia/S Coefficient
    8.924      Initial Abstraction
        1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .858      .000     4.762     4.762 c.m/s
          .267      .887      .701   C perv/imperv/total
15    ADD RUNOFF
          .858      .858     4.762     4.762 c.m/s
 9    ROUTE
     .000      Conduit Length
     .000      No Conduit defined
     .000      Zero lag
     .000      Beta weighting factor
     .000      Routing timestep
        0      No. of sub-reaches
          .858      .858      .858     4.762 c.m/s
17    COMBINE
    2      Junction Node No.
          .858      .858      .858      .858 c.m/s
14    START
    1      1=Zero; 2=Define
 4    CATCHMENT
   53.000      ID No.ó 99999
   11.340      Area in hectares
  275.000      Length (PERV) metres
    1.000      Gradient (%)
   70.000      Per cent Impervious
  275.000      Length (IMPERV)
     .000      %Imp. with Zero Dpth
        1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250      Manning "n"
   74.000      SCS Curve No or C
     .100      Ia/S Coefficient
    8.924      Initial Abstraction
        1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         1.523      .000      .858      .858 c.m/s
          .267      .897      .708   C perv/imperv/total
15    ADD RUNOFF
         1.523     1.523      .858      .858 c.m/s
 9    ROUTE
     .000      Conduit Length
     .000      No Conduit defined
     .000      Zero lag
     .000      Beta weighting factor
     .000      Routing timestep
        0      No. of sub-reaches
         1.523     1.523     1.523      .858 c.m/s
17    COMBINE
    2      Junction Node No.
         1.523     1.523     1.523     2.381 c.m/s
18    CONFLUENCE
    2      Junction Node No.
         1.523     2.381     1.523      .000 c.m/s
 4    CATCHMENT
   54.000      ID No.ó 99999
    1.280      Area in hectares
   92.000      Length (PERV) metres
    1.000      Gradient (%)
   60.000      Per cent Impervious
   92.000      Length (IMPERV)
     .000      %Imp. with Zero Dpth
        1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250      Manning "n"
   74.000      SCS Curve No or C
     .100      Ia/S Coefficient
    8.924      Initial Abstraction
        1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .149     2.381     1.523      .000 c.m/s
          .267      .887      .639   C perv/imperv/total
15    ADD RUNOFF
          .149     2.514     1.523      .000 c.m/s
27    HYDROGRAPH DISPLAY
    5      is # of Hyeto/Hydrograph chosen
       Volume  =  .6870401E+04 c.m
10    POND
    6 Depth - Discharge - Volume sets
  182.000       .000        .0
  182.800      .0190     5251.0
  183.150      .0230     7895.0
  183.500      .238     10751.0
  183.800      .396     13425.0
  184.000     1.028     15337.0
       Peak Outflow  =      .021 c.m/s
       Maximum Depth  =   182.962 metres
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        Maximum Storage =      6474. c.m
                 .149      2.514      .021       .000 c.m/s
17    COMBINE
      2    Junction Node No.
                 .149      2.514      .021       .021 c.m/s
14    START
      1    1=Zero; 2=Define
35    COMMENT
      3    line(s) of comment
      ************************
      EXISTING AREA ON QUAKER RD, EAST OF RICE RD
      ************************
 4    CATCHMENT
      5.000      ID No.ó 99999
      1.870      Area in hectares
    112.000      Length (PERV) metres
      1.000      Gradient (%)
     50.000      Per cent Impervious
    112.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                 .175       .000      .021       .021 c.m/s
                 .267       .885      .576       C perv/imperv/total
15    ADD RUNOFF
                 .175       .175      .021       .021 c.m/s
 9    ROUTE
       .000      Conduit Length
       .000      No Conduit defined
       .000      Zero lag
       .000      Beta weighting factor
       .000      Routing timestep
          0      No. of sub-reaches
                 .175       .175      .175       .021 c.m/s
17    COMBINE
      2    Junction Node No.
                 .175       .175      .175       .180 c.m/s
18    CONFLUENCE
      2    Junction Node No.
                 .175       .180      .175       .000 c.m/s
35    COMMENT
      3    line(s) of comment
      ************************
      EXISTING AREA ON QUAKER RD, EAST OF RICE RD
      ************************
 4    CATCHMENT
      6.000      ID No.ó 99999
      1.920      Area in hectares
    113.000      Length (PERV) metres
       .200      Gradient (%)
     65.000      Per cent Impervious
    113.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.470      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                 .240       .180      .175       .000 c.m/s
                 .267       .896      .676       C perv/imperv/total
15    ADD RUNOFF
                 .240       .418      .175       .000 c.m/s
35    COMMENT
      3    line(s) of comment
      ***********
      FIRST AVE FROM QUAKER RD TO CITY OF WELLAND MUNICIPAL BOUNDA
      ***********
 4    CATCHMENT
    201.000      ID No.ó 99999
      2.430      Area in hectares
    127.000      Length (PERV) metres
      1.000      Gradient (%)
     65.000      Per cent Impervious
    127.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                 .287       .418      .175       .000 c.m/s
                 .267       .882      .667       C perv/imperv/total
15    ADD RUNOFF
                 .287       .705      .175       .000 c.m/s
 9    ROUTE
       .000      Conduit Length
       .000      No Conduit defined
       .000      Zero lag
       .000      Beta weighting factor
       .000      Routing timestep
          0      No. of sub-reaches
                 .287       .705      .705       .000 c.m/s
17    COMBINE
      1    Junction Node No.
                 .287       .705      .705       5.467 c.m/s
35    COMMENT
      3    line(s) of comment
      ************************
      FLOW D/S OF FIRST AVE CULVERT - OUTLET C
      ************************
18    CONFLUENCE
      1    Junction Node No.
                 .287      5.467      .705       .000 c.m/s
```

```
35    COMMENT
      3    line(s) of comment
      ***********
      REALIGNED CHANNEL - SEGMENT 3
      ***********
 4    CATCHMENT
    300.000      ID No.ó 99999
      3.180      Area in hectares
    146.000      Length (PERV) metres
       .200      Gradient (%)
     15.000      Per cent Impervious
    146.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Triangl; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                 .099      5.467      .705       .000 c.m/s
                 .267       .894      .361       C perv/imperv/total
15    ADD RUNOFF
                 .099      5.566      .705       .000 c.m/s
 4    CATCHMENT
    301.000      ID No.ó 99999
       .720      Area in hectares
     69.000      Length (PERV) metres
       .200      Gradient (%)
     10.000      Per cent Impervious
     69.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                 .016      5.566      .705       .000 c.m/s
                 .267       .876      .328       C perv/imperv/total
15    ADD RUNOFF
                 .016      5.582      .705       .000 c.m/s
 9    ROUTE
       .000      Conduit Length
       .000      No Conduit defined
       .000      Zero lag
       .000      Beta weighting factor
       .000      Routing timestep
          0      No. of sub-reaches
                 .016      5.582     5.582       .000 c.m/s
17    COMBINE
      1    Junction Node No.
                 .016      5.582     5.582      5.582 c.m/s
14    START
      1    1=Zero; 2=Define
35    COMMENT
      3    line(s) of comment
      ***********
      PROP DEVELOPMENT NORTH OF SEGMENT 3 - POND P30
      ***********
 4    CATCHMENT
     30.000      ID No.ó 99999
      8.470      Area in hectares
    238.000      Length (PERV) metres
       .200      Gradient (%)
       .100      Per cent Impervious
    238.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                 .077       .000     5.582      5.582 c.m/s
                 .267       .896      .267       C perv/imperv/total
15    ADD RUNOFF
                 .077       .077     5.582      5.582 c.m/s
 4    CATCHMENT
     31.000      ID No.ó 99999
     10.420      Area in hectares
    264.000      Length (PERV) metres
      1.000      Gradient (%)
     75.000      Per cent Impervious
    264.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
       .100      Ia/S Coefficient
      8.924      Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                1.498       .077     5.582      5.582 c.m/s
                 .267       .897      .739       C perv/imperv/total
15    ADD RUNOFF
                1.498      1.509     5.582      5.582 c.m/s
27    HYDROGRAPH DISPLAY
      5    is # of Hyeto/Hydrograph chosen
      Volume  = .5129908E+04 c.m
 4    CATCHMENT
     32.000      ID No.ó 99999
       .690      Area in hectares
     68.000      Length (PERV) metres
      1.000      Gradient (%)
     60.000      Per cent Impervious
     68.000      Length (IMPERV)
       .000      %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250      Manning "n"
     74.000      SCS Curve No or C
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         .100      Ia/S Coefficient
        8.924      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .085     1.509      5.582       5.582 c.m/s
             .267      .884       .637       C perv/imperv/total
15    ADD RUNOFF
             .085     1.576      5.582       5.582 c.m/s
27    HYDROGRAPH DISPLAY
       5      is # of Hyeto/Hydrograph chosen
       Volume = .5356146E+04 c.m
10    POND
       5 Depth - Discharge - Volume sets
        178.800        .000          .0
        179.300        .0260      1520.0
        180.100        .0440      4649.0
        180.600        .414       7069.0
        180.800       1.204       8137.0
        Peak Outflow    =       .042 c.m/s
        Maximum Depth   =    180.027 metres
        Maximum Storage =      4365. c.m
             .085     1.576       .042       5.582 c.m/s
17    COMBINE
       1      Junction Node No.
             .085     1.576       .042       5.608 c.m/s
14    START
       1      1=Zero; 2=Define
35    COMMENT
       3      line(s) of comment
       ***********
       PROP DEVELOPMENT SOUTH OF SEGMENT 3 - POND P31
       ***********
 4    CATCHMENT
       33.000      ID No.ó 99999
       12.960      Area in hectares
      294.000      Length (PERV) metres
        1.000      Gradient (%)
       75.000      Per cent Impervious
      294.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       74.000      SCS Curve No or C
         .100      Ia/S Coefficient
        8.924      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            1.919     .000       .042       5.608 c.m/s
             .267     .897       .739       C perv/imperv/total
15    ADD RUNOFF
            1.919    1.919       .042       5.608 c.m/s
27    HYDROGRAPH DISPLAY
       5      is # of Hyeto/Hydrograph chosen
       Volume = .4931688E+04 c.m
 4    CATCHMENT
       34.000      ID No.ó 99999
         .660      Area in hectares
       66.000      Length (PERV) metres
        1.000      Gradient (%)
       60.000      Per cent Impervious
       66.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       74.000      SCS Curve No or C
         .100      Ia/S Coefficient
        8.924      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .082    1.919       .042       5.608 c.m/s
             .267     .884       .637       C perv/imperv/total
15    ADD RUNOFF
             .082    1.983       .042       5.608 c.m/s
27    HYDROGRAPH DISPLAY
       5      is # of Hyeto/Hydrograph chosen
       Volume = .5148061E+04 c.m
10    POND
       6 Depth - Discharge - Volume sets
        178.300        .000          .0
        178.900        .0350      1927.0
        179.600        .0540      4692.0
        179.800        .150       5590.0
        180.000        .321       6538.0
        180.300       1.922       8059.0
        Peak Outflow    =       .052 c.m/s
        Maximum Depth   =    179.543 metres
        Maximum Storage =      4465. c.m
             .082    1.983       .052       5.608 c.m/s
17    COMBINE
       1      Junction Node No.
             .082    1.983       .052       5.642 c.m/s
14    START
       1      1=Zero; 2=Define
18    CONFLUENCE
       1      Junction Node No.
             .082    5.642       .052        .000 c.m/s
35    COMMENT
       3      line(s) of comment
       ***********************
       REALIGNED CHANNEL - SEGMENT 3
       ***********************
 4    CATCHMENT
      302.000      ID No.ó 99999
        1.610      Area in hectares
      104.000      Length (PERV) metres
         .200      Gradient (%)
       10.000      Per cent Impervious
      104.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       74.000      SCS Curve No or C
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         .100      Ia/S Coefficient
        8.924      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .035     5.642       .052        .000 c.m/s
             .267      .893       .329       C perv/imperv/total
35    COMMENT
       3      line(s) of comment
       ***************************
       FLOW U/S OF NIAGARA ST CULVERT - OUTLET D
       ***************************
15    ADD RUNOFF
             .035     5.677       .052        .000 c.m/s
14    START
       1      1=Zero; 2=Define
```

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 35    COMMENT
    3    line(s) of comment
       *********************************************************
       25-YEAR STORM EVENT
       *********************************************************
 2     STORM
       1        1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
 900.000        Coefficient  a
   5.200        Constant   b     (min)
    .745        Exponent   c
    .450        Fraction to peak   r
 240.000        Duration  δ   240 min
  59.713 mm     Total depth
 3     IMPERVIOUS
       1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .015        Manning "n"
  98.000        SCS Curve No or C
    .100        Ia/S Coefficient
    .518        Initial Abstraction
 35    COMMENT
    3    line(s) of comment
       ******************
       EXISTING RES. WEST OF SEGMENT 1
       ******************
 4     CATCHMENT
   1.000        ID No.δ 99999
  17.520        Area in hectares
 343.000        Length (PERV) metres
   1.000        Gradient (%)
  35.000        Per cent Impervious
 343.000        Length (IMPERV)
    .000        %Imp. with Zero Dpth
       1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250        Manning "n"
  74.000        SCS Curve No or C
    .100        Ia/S Coefficient
   8.924        Initial Abstraction
       1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           1.445      .000       .000       .000 c.m/s
            .308      .909       .518       C perv/imperv/total
 15    ADD RUNOFF
           1.445     1.445       .000       .000 c.m/s
 35    COMMENT
    3    line(s) of comment
       ******************
       REALIGNED CHANNEL - SEGMENT 1
       ******************
 4     CATCHMENT
 100.000        ID No.δ 99999
   2.020        Area in hectares
 116.000        Length (PERV) metres
    .400        Gradient (%)
  15.000        Per cent Impervious
 116.000        Length (IMPERV)
    .000        %Imp. with Zero Dpth
       1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250        Manning "n"
  74.000        SCS Curve No or C
    .100        Ia/S Coefficient
   8.924        Initial Abstraction
       1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .077     1.445       .000       .000 c.m/s
            .308      .891       .396       C perv/imperv/total
 35    COMMENT
    3    line(s) of comment
       ******************
       FLOW AT FUT ROADWAY CULVERT - SEGMENT 1
       ******************
 15    ADD RUNOFF
            .077     1.522       .000       .000 c.m/s
 9     ROUTE
    .000        Conduit Length
    .000        No Conduit defined
    .000        Zero lag
    .000        Beta weighting factor
    .000        Routing timestep
       0        No. of sub-reaches
            .077     1.522     1.522       .000 c.m/s
 17    COMBINE
       1        Junction Node No.
            .077     1.522     1.522      1.522 c.m/s
 14    START
       1        1=Zero; 2=Define
 35    COMMENT
    3    line(s) of comment
       ******************
       PROP DEVELOPMENT NORTH OF SEGMENT 1 - POND P10
       ******************
 4     CATCHMENT
  10.000        ID No.δ 99999
   4.050        Area in hectares
 164.000        Length (PERV) metres
   1.000        Gradient (%)
  70.000        Per cent Impervious
 164.000        Length (IMPERV)
    .000        %Imp. with Zero Dpth
       1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250        Manning "n"
  74.000        SCS Curve No or C
    .100        Ia/S Coefficient
   8.924        Initial Abstraction
       1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .612      .000     1.522      1.522 c.m/s
            .308      .889       .715       C perv/imperv/total
 15    ADD RUNOFF
            .612      .612     1.522      1.522 c.m/s
 4     CATCHMENT
  11.000        ID No.δ 99999
   1.000        Area in hectares
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  82.000        Length (PERV) metres
   1.000        Gradient (%)
  10.000        Per cent Impervious
  82.000        Length (IMPERV)
    .000        %Imp. with Zero Dpth
       1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250        Manning "n"
  74.000        SCS Curve No or C
    .100        Ia/S Coefficient
   8.924        Initial Abstraction
       1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .033      .612     1.522      1.522 c.m/s
            .308      .898       .367       C perv/imperv/total
 15    ADD RUNOFF
            .033      .644     1.522      1.522 c.m/s
 10    POND
    6 Depth - Discharge - Volume sets
  184.800       .000        .0
  185.750       .0210       1.0
  186.000       .0230      503.0
  186.250       .0260     1091.0
  186.500       .0280     1765.0
  186.700      1.244      2370.0
    Peak Outflow   =      .027 c.m/s
    Maximum Depth  =   186.413 metres
    Maximum Storage =     1531. c.m
            .033      .644       .027      1.522 c.m/s
 17    COMBINE
       1        Junction Node No.
            .033      .644       .027      1.546 c.m/s
 14    START
       1        1=Zero; 2=Define
 18    CONFLUENCE
       1        Junction Node No.
            .033     1.546       .027       .000 c.m/s
 35    COMMENT
    3    line(s) of comment
       ******************
       REALIGNED CHANNEL - SEGMENT 1
       ******************
 4     CATCHMENT
 101.000        ID No.δ 99999
    .610        Area in hectares
  64.000        Length (PERV) metres
   1.000        Gradient (%)
  10.000        Per cent Impervious
  64.000        Length (IMPERV)
    .000        %Imp. with Zero Dpth
       1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250        Manning "n"
  74.000        SCS Curve No or C
    .100        Ia/S Coefficient
   8.924        Initial Abstraction
       1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .023     1.546       .027       .000 c.m/s
            .308      .899       .367       C perv/imperv/total
 15    ADD RUNOFF
            .023     1.567       .027       .000 c.m/s
 9     ROUTE
    .000        Conduit Length
    .000        No Conduit defined
    .000        Zero lag
    .000        Beta weighting factor
    .000        Routing timestep
       0        No. of sub-reaches
            .023     1.567     1.567       .000 c.m/s
 17    COMBINE
       1        Junction Node No.
            .023     1.567     1.567      1.567 c.m/s
 14    START
       1        1=Zero; 2=Define
 35    COMMENT
    3    line(s) of comment
       ******************
       PROP DEVELOPMENT SOUTH OF SEGMENT 1 - POND P11
       ******************
 4     CATCHMENT
  12.000        ID No.δ 99999
   2.680        Area in hectares
 134.000        Length (PERV) metres
   1.000        Gradient (%)
  35.000        Per cent Impervious
 134.000        Length (IMPERV)
    .000        %Imp. with Zero Dpth
       1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250        Manning "n"
  74.000        SCS Curve No or C
    .100        Ia/S Coefficient
   8.924        Initial Abstraction
       1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .209      .000     1.567      1.567 c.m/s
            .308      .897       .514       C perv/imperv/total
 15    ADD RUNOFF
            .209      .209     1.567      1.567 c.m/s
 4     CATCHMENT
  13.000        ID No.δ 99999
   6.980        Area in hectares
 216.000        Length (PERV) metres
   1.000        Gradient (%)
  70.000        Per cent Impervious
 216.000        Length (IMPERV)
    .000        %Imp. with Zero Dpth
       1        Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
    .250        Manning "n"
  74.000        SCS Curve No or C
    .100        Ia/S Coefficient
   8.924        Initial Abstraction
       1        Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           1.083      .209     1.567      1.567 c.m/s
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                  .308        .897        .721      C perv/imperv/total      74.000     SCS Curve No or C
15     ADD RUNOFF                                                             .100     Ia/S Coefficient
              1.083       1.292       1.567       1.567 c.m/s               8.924     Initial Abstraction
 4     CATCHMENT                                                               1       Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      14.000     ID No.ó 99999                                                       1.980        .061        .484       .484 c.m/s
        .670     Area in hectares                                                     .308        .910        .729      C perv/imperv/total
      67.000     Length (PERV) metres                               15     ADD RUNOFF
       1.000     Gradient (%)                                                      1.980       2.030        .484       .484 c.m/s
      60.000     Per cent Impervious                                 9     ROUTE
      67.000     Length (IMPERV)                                                    .000     Conduit Length
        .000     %Imp. with Zero Dpth                                              .000     No Conduit defined
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat             .000     Zero lag
        .250     Manning "n"                                                       .000     Beta weighting factor
      74.000     SCS Curve No or C                                                 .000     Routing timestep
        .100     Ia/S Coefficient                                                    0     No. of sub-reaches
       8.924     Initial Abstraction                                              1.980       2.030       2.030       .484 c.m/s
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  17     COMBINE
               .099       1.292       1.567       1.567 c.m/s                      2     Junction Node No.
               .308        .898        .662      C perv/imperv/total              1.980       2.030       2.030      2.514 c.m/s
15     ADD RUNOFF                                                        14     START
               .099       1.367       1.567       1.567 c.m/s                      1     1=Zero; 2=Define
27     HYDROGRAPH DISPLAY                                               4     CATCHMENT
          5     is # of Hyeto/Hydrograph chosen                              43.000     ID No.ó 99999
       Volume  = .4091430E+04 c.m                                            .330     Area in hectares
10     POND                                                               47.000     Length (PERV) metres
       5 Depth - Discharge - Volume sets                                    1.000     Gradient (%)
      184.800        .000          .0                                      35.000     Per cent Impervious
      185.300       .0140      1142.0                                       47.000     Length (IMPERV)
      186.100       .0240      3519.0                                         .000     %Imp. with Zero Dpth
      186.500        .287      4978.0                                           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      186.800       1.922      6222.0                                         .250     Manning "n"
       Peak Outflow   =        .048 c.m/s                                   74.000     SCS Curve No or C
       Maximum Depth  =    186.136 metres                                     .100     Ia/S Coefficient
       Maximum Storage =     3650. c.m                                       8.924     Initial Abstraction
               .099       1.367        .048       1.567 c.m/s                   1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
35     COMMENT                                                                    .031        .000       2.030      2.514 c.m/s
          3     line(s) of comment                                                .308        .898        .515      C perv/imperv/total
       *****************                                                15     ADD RUNOFF
       FLOW U/S OF RICE RD CULVERT - OUTLET A1                                    .031        .031       2.030      2.514 c.m/s
       *****************                                               4     CATCHMENT
17     COMBINE                                                              44.000     ID No.ó 99999
          1     Junction Node No.                                            6.400     Area in hectares
               .099       1.367        .048       1.583 c.m/s             207.000     Length (PERV) metres
14     START                                                                1.000     Gradient (%)
          1     1=Zero; 2=Define                                           70.000     Per cent Impervious
35     COMMENT                                                             207.000     Length (IMPERV)
          3     line(s) of comment                                            .000     %Imp. with Zero Dpth
       ***********************                                                  1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       PROP DEVELOPMENT SOUTH OF QUAKER RD & WEST OF RICE RD. - PON           .250     Manning "n"
       ***********************                                              74.000     SCS Curve No or C
 4     CATCHMENT                                                             .100     Ia/S Coefficient
      40.000     ID No.ó 99999                                              8.924     Initial Abstraction
       8.210     Area in hectares                                              1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
     234.000     Length (PERV) metres                                            .990        .031       2.030      2.514 c.m/s
       1.000     Gradient (%)                                                     .308        .896        .719      C perv/imperv/total
      25.000     Per cent Impervious                                 15     ADD RUNOFF
     234.000     Length (IMPERV)                                                  .990       1.014       2.030      2.514 c.m/s
        .000     %Imp. with Zero Dpth                                9     ROUTE
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat          .000     Conduit Length
        .250     Manning "n"                                                   .000     No Conduit defined
      74.000     SCS Curve No or C                                             .000     Zero lag
        .100     Ia/S Coefficient                                              .000     Beta weighting factor
       8.924     Initial Abstraction                                           .000     Routing timestep
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv        0     No. of sub-reaches
               .484        .000        .048       1.583 c.m/s                     .990       1.014       1.014      2.514 c.m/s
               .308        .902        .457      C perv/imperv/total  17     COMBINE
15     ADD RUNOFF                                                              2     Junction Node No.
               .484        .484        .048       1.583 c.m/s                     .990       1.014       1.014      3.528 c.m/s
 9     ROUTE                                                          14     START
        .000     Conduit Length                                                1     1=Zero; 2=Define
        .000     No Conduit defined                                 18     CONFLUENCE
        .000     Zero lag                                                      2     Junction Node No.
        .000     Beta weighting factor                                            .990       3.528       1.014       .000 c.m/s
        .000     Routing timestep                                     4     CATCHMENT
          0     No. of sub-reaches                                          45.000     ID No.ó 99999
               .484        .484        .484       1.583 c.m/s               1.030     Area in hectares
17     COMBINE                                                             83.000     Length (PERV) metres
          2     Junction Node No.                                           1.000     Gradient (%)
               .484        .484        .484        .484 c.m/s              60.000     Per cent Impervious
14     START                                                               83.000     Length (IMPERV)
          1     1=Zero; 2=Define                                              .000     %Imp. with Zero Dpth
 4     CATCHMENT                                                                1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      41.000     ID No.ó 99999                                               .250     Manning "n"
        .690     Area in hectares                                           74.000     SCS Curve No or C
      68.000     Length (PERV) metres                                         .100     Ia/S Coefficient
       1.000     Gradient (%)                                                8.924     Initial Abstraction
      35.000     Per cent Impervious                                           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      68.000     Length (IMPERV)                                                  .147       3.528       1.014       .000 c.m/s
        .000     %Imp. with Zero Dpth                                             .308        .899        .662      C perv/imperv/total
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  15     ADD RUNOFF
        .250     Manning "n"                                                      .147       3.648       1.014       .000 c.m/s
      74.000     SCS Curve No or C                                   27     HYDROGRAPH DISPLAY
        .100     Ia/S Coefficient                                              5     is # of Hyeto/Hydrograph chosen
       8.924     Initial Abstraction                                        Volume  = .1120983E+05 c.m
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  10     POND
               .061        .000        .484        .484 c.m/s               6 Depth - Discharge - Volume sets
               .308        .898        .515      C perv/imperv/total       186.000        .000          .0
15     ADD RUNOFF                                                         186.800       .0550      4048.0
               .061        .061        .484        .484 c.m/s             187.300       .0730      7091.0
 4     CATCHMENT                                                         187.500        .170      8424.0
      42.000     ID No.ó 99999                                           187.800        .257     10552.0
      12.640     Area in hectares                                        188.000        .880     12094.0
     290.000     Length (PERV) metres                                      Peak Outflow   =        .198 c.m/s
       1.000     Gradient (%)                                              Maximum Depth  =    187.598 metres
      70.000     Per cent Impervious                                       Maximum Storage =     9121. c.m
     290.000     Length (IMPERV)                                                  .147       3.648        .198       .000 c.m/s
        .000     %Imp. with Zero Dpth                                17     COMBINE
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat          2     Junction Node No.
        .250     Manning "n"                                                      .147       3.648        .198        .198 c.m/s
```

```
14     START
 1     1=Zero; 2=Define
35     COMMENT
 3     line(s) of comment
       ***********************
       EXISTING AREA ON QUAKER RD, WEST OF RICE RD
       ***********************
 4     CATCHMENT
 2.000     ID No.ó 99999
 9.020     Area in hectares
245.000     Length (PERV) metres
 1.000     Gradient (%)
40.000     Per cent Impervious
245.000     Length (IMPERV)
  .000     %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
  .250     Manning "n"
74.000     SCS Curve No or C
  .100     Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
        .824       .000       .198       .198 c.m/s
        .308       .904       .547   C perv/imperv/total
15     ADD RUNOFF
        .824       .824       .198       .198 c.m/s
 9     ROUTE
  .000     Conduit Length
  .000     No Conduit defined
  .000     Zero lag
  .000     Beta weighting factor
  .000     Routing timestep
    0     No. of sub-reaches
        .824       .824       .824       .198 c.m/s
17     COMBINE
 2     Junction Node No.
        .824       .824       .824       .877 c.m/s
14     START
 1     1=Zero; 2=Define
18     CONFLUENCE
 2     Junction Node No.
        .824       .877       .824       .000 c.m/s
35     COMMENT
 3     line(s) of comment
       ***********************
       EXISTING AREA ON QUAKER RD, WEST OF RICE RD
       ***********************
 4     CATCHMENT
 3.000     ID No.ó 99999
 5.680     Area in hectares
195.000     Length (PERV) metres
 1.000     Gradient (%)
40.000     Per cent Impervious
195.000     Length (IMPERV)
  .000     %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
  .250     Manning "n"
74.000     SCS Curve No or C
  .100     Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
        .515       .877       .824       .000 c.m/s
        .308       .894       .543   C perv/imperv/total
15     ADD RUNOFF
        .515      1.392       .824       .000 c.m/s
 9     ROUTE
  .000     Conduit Length
  .000     No Conduit defined
  .000     Zero lag
  .000     Beta weighting factor
  .000     Routing timestep
    0     No. of sub-reaches
        .515      1.392      1.392       .000 c.m/s
17     COMBINE
 2     Junction Node No.
        .515      1.392      1.392      1.392 c.m/s
14     START
 1     1=Zero; 2=Define
35     COMMENT
 3     line(s) of comment
       ***********************
       PROP DEVELOPMENT SOUTH OF QUAKER RD, EAST OF RICE RD
       ***********************
 4     CATCHMENT
50.000     ID No.ó 99999
 3.420     Area in hectares
151.000     Length (PERV) metres
 1.000     Gradient (%)
10.000     Per cent Impervious
151.000     Length (IMPERV)
  .000     %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
  .250     Manning "n"
74.000     SCS Curve No or C
  .100     Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
        .097       .000      1.392      1.392 c.m/s
        .308       .892       .367   C perv/imperv/total
15     ADD RUNOFF
        .097       .097      1.392      1.392 c.m/s
 4     CATCHMENT
51.000     ID No.ó 99999
 1.980     Area in hectares
115.000     Length (PERV) metres
 1.000     Gradient (%)
10.000     Per cent Impervious
115.000     Length (IMPERV)
  .000     %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
```

```
        .250     Manning "n"
74.000     SCS Curve No or C
  .100     Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
        .059       .097      1.392      1.392 c.m/s
        .308       .899       .367   C perv/imperv/total
15     ADD RUNOFF
        .059       .156      1.392      1.392 c.m/s
 9     ROUTE
  .000     Conduit Length
  .000     No Conduit defined
  .000     Zero lag
  .000     Beta weighting factor
  .000     Routing timestep
    0     No. of sub-reaches
        .059       .156       .156      1.392 c.m/s
17     COMBINE
 2     Junction Node No.
        .059       .156       .156      1.548 c.m/s
14     START
 1     1=Zero; 2=Define
35     COMMENT
 3     line(s) of comment
       ***********************
       EXISTING AREA WEST OF RICE RD AND SOUTH OF QUAKER ROAD
       ***********************
 4     CATCHMENT
 4.000     ID No.ó 99999
13.940     Area in hectares
305.000     Length (PERV) metres
 1.000     Gradient (%)
40.000     Per cent Impervious
305.000     Length (IMPERV)
  .000     %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
  .250     Manning "n"
74.000     SCS Curve No or C
  .100     Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       1.270       .000       .156      1.548 c.m/s
        .308       .910       .549   C perv/imperv/total
15     ADD RUNOFF
       1.270      1.270       .156      1.548 c.m/s
 9     ROUTE
  .000     Conduit Length
  .000     No Conduit defined
  .000     Zero lag
  .000     Beta weighting factor
  .000     Routing timestep
    0     No. of sub-reaches
       1.270      1.270      1.270      1.548 c.m/s
17     COMBINE
 2     Junction Node No.
       1.270      1.270      1.270      2.818 c.m/s
14     START
 1     1=Zero; 2=Define
18     CONFLUENCE
 2     Junction Node No.
       1.270      2.818      1.270       .000 c.m/s
35     COMMENT
 3     line(s) of comment
       *****************
       RICE ROAD FROM QUAKER RD TO CITY OF WELLAND MUNICIPAL BOUNDA
       *****************
 4     CATCHMENT
501.000     ID No.ó 99999
 1.570     Area in hectares
102.000     Length (PERV) metres
 1.000     Gradient (%)
70.000     Per cent Impervious
102.000     Length (IMPERV)
  .000     %Imp. with Zero Dpth
 1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
  .250     Manning "n"
74.000     SCS Curve No or C
  .100     Ia/S Coefficient
 8.924     Initial Abstraction
 1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
        .250      2.818      1.270       .000 c.m/s
        .308       .901       .723   C perv/imperv/total
15     ADD RUNOFF
        .250      3.038      1.270       .000 c.m/s
 9     ROUTE
  .000     Conduit Length
  .000     No Conduit defined
  .000     Zero lag
  .000     Beta weighting factor
  .000     Routing timestep
    0     No. of sub-reaches
        .250      3.038      3.038       .000 c.m/s
35     COMMENT
 3     line(s) of comment
       *****************
       FLOW D/S OF RICE RD CULVERT - OUTLET A2
       *****************
17     COMBINE
 1     Junction Node No.
        .250      3.038      3.038      4.621 c.m/s
14     START
 1     1=Zero; 2=Define
35     COMMENT
 3     line(s) of comment
       *****************
       PROP DEVELOPMENT SOUTH OF QUAKER RD - QUALLITY CONTROL ONLY
       *****************
 4     CATCHMENT
20.100     ID No.ó 99999
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      .780      Area in hectares
    72.000      Length (PERV) metres
     1.000      Gradient (%)
    35.000      Per cent Impervious
    72.000      Length (IMPERV)
      .000      %Imp. with Zero Dpth
         1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250      Manning "n"
    74.000      SCS Curve No or C
      .100      Ia/S Coefficient
     8.924      Initial Abstraction
         1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .068      .000     3.038     4.621 c.m/s
              .308      .897      .514     C perv/imperv/total
 15    ADD RUNOFF
              .068      .068     3.038     4.621 c.m/s
  4    CATCHMENT
    20.000      ID No.ó 99999
     3.210      Area in hectares
   146.000      Length (PERV) metres
     1.000      Gradient (%)
    85.000      Per cent Impervious
   146.000      Length (IMPERV)
      .000      %Imp. with Zero Dpth
         1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250      Manning "n"
    74.000      SCS Curve No or C
      .100      Ia/S Coefficient
     8.924      Initial Abstraction
         1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .575      .068     3.038     4.621 c.m/s
              .308      .893      .806     C perv/imperv/total
 15    ADD RUNOFF
              .575      .639     3.038     4.621 c.m/s
  9    ROUTE
      .000      Conduit Length
      .000      No Conduit defined
      .000      Zero lag
      .000      Beta weighting factor
      .000      Routing timestep
         0      No. of sub-reaches
              .575      .639      .639     4.621 c.m/s
 17    COMBINE
         1      Junction Node No.
              .575      .639      .639     5.253 c.m/s
 14    START
         1      1=Zero; 2=Define
 18    CONFLUENCE
         1      Junction Node No.
              .575     5.253      .639      .000 c.m/s
 35    COMMENT
         3      line(s) of comment
              *****************
              REALIGNED CHANNEL - SEGMENT 2
              *****************
  4    CATCHMENT
   200.000      ID No.ó 99999
      .970      Area in hectares
    80.416      Length (PERV) metres
     1.000      Gradient (%)
    10.000      Per cent Impervious
    80.416      Length (IMPERV)
      .000      %Imp. with Zero Dpth
         1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250      Manning "n"
    74.000      SCS Curve No or C
      .100      Ia/S Coefficient
     8.924      Initial Abstraction
         1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .032     5.253      .639      .000 c.m/s
              .308      .898      .367     C perv/imperv/total
 35    COMMENT
         3      line(s) of comment
              *****************
              FLOW D/S OF AREA A20 - OUTLET B
              *****************
 15    ADD RUNOFF
              .032     5.284      .639      .000 c.m/s
 35    COMMENT
         3      line(s) of comment
              ************************
              EX RES. AND FUT DEVELOPMENT LANDS BY OTHERS WEST OF FIRST AV
              ************************
  4    CATCHMENT
    21.000      ID No.ó 99999
    35.460      Area in hectares
   487.000      Length (PERV) metres
      .200      Gradient (%)
     5.000      Per cent Impervious
   487.000      Length (IMPERV)
      .000      %Imp. with Zero Dpth
         1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250      Manning "n"
    74.000      SCS Curve No or C
      .100      Ia/S Coefficient
     8.924      Initial Abstraction
         1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .338     5.284      .639      .000 c.m/s
              .308      .911      .339     C perv/imperv/total
 15    ADD RUNOFF
              .338     5.586      .639      .000 c.m/s
  9    ROUTE
      .000      Conduit Length
      .000      No Conduit defined
      .000      Zero lag
      .000      Beta weighting factor
      .000      Routing timestep
         0      No. of sub-reaches
              .338     5.586     5.586      .000 c.m/s
```

```
 35    COMMENT
         3      line(s) of comment
              ************************
              FLOW U/S OF FIRST AVE CULVERT
              ************************
 17    COMBINE
         1      Junction Node No.
              .338     5.586     5.586     5.586 c.m/s
 14    START
         1      1=Zero; 2=Define
 35    COMMENT
         3      line(s) of comment
              ***********
              PROP DEVELOPMENT SOUTH OF QUAKER, EAST OF RICE - POND P50
              ***********
  4    CATCHMENT
    52.000      ID No.ó 99999
     6.430      Area in hectares
   207.000      Length (PERV) metres
     1.000      Gradient (%)
    70.000      Per cent Impervious
   207.000      Length (IMPERV)
      .000      %Imp. with Zero Dpth
         1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250      Manning "n"
    74.000      SCS Curve No or C
      .100      Ia/S Coefficient
     8.924      Initial Abstraction
         1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .995      .000     5.586     5.586 c.m/s
              .308      .896      .719     C perv/imperv/total
 15    ADD RUNOFF
              .995      .995     5.586     5.586 c.m/s
  9    ROUTE
      .000      Conduit Length
      .000      No Conduit defined
      .000      Zero lag
      .000      Beta weighting factor
      .000      Routing timestep
         0      No. of sub-reaches
              .995      .995      .995     5.586 c.m/s
 17    COMBINE
         2      Junction Node No.
              .995      .995      .995      .995 c.m/s
 14    START
         1      1=Zero; 2=Define
  4    CATCHMENT
    53.000      ID No.ó 99999
    11.340      Area in hectares
   275.000      Length (PERV) metres
     1.000      Gradient (%)
    70.000      Per cent Impervious
   275.000      Length (IMPERV)
      .000      %Imp. with Zero Dpth
         1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250      Manning "n"
    74.000      SCS Curve No or C
      .100      Ia/S Coefficient
     8.924      Initial Abstraction
         1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.776      .000      .995      .995 c.m/s
              .308      .908      .728     C perv/imperv/total
 15    ADD RUNOFF
             1.776     1.776      .995      .995 c.m/s
  9    ROUTE
      .000      Conduit Length
      .000      No Conduit defined
      .000      Zero lag
      .000      Beta weighting factor
      .000      Routing timestep
         0      No. of sub-reaches
             1.776     1.776     1.776      .995 c.m/s
 17    COMBINE
         2      Junction Node No.
             1.776     1.776     1.776     2.771 c.m/s
 18    CONFLUENCE
         2      Junction Node No.
             1.776     2.771     1.776      .000 c.m/s
  4    CATCHMENT
    54.000      ID No.ó 99999
     1.280      Area in hectares
    92.000      Length (PERV) metres
     1.000      Gradient (%)
    60.000      Per cent Impervious
    92.000      Length (IMPERV)
      .000      %Imp. with Zero Dpth
         1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250      Manning "n"
    74.000      SCS Curve No or C
      .100      Ia/S Coefficient
     8.924      Initial Abstraction
         1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .179     2.771     1.776      .000 c.m/s
              .308      .900      .663     C perv/imperv/total
 15    ADD RUNOFF
              .179     2.924     1.776      .000 c.m/s
 27    HYDROGRAPH DISPLAY
         5      is # of Hyeto/Hydrograph chosen
              Volume  =  .8196629E+04 c.m
 10    POND
         6 Depth - Discharge - Volume sets
   182.000       .000         .0
   182.800      .0190      5251.0
   183.150      .0230      7895.0
   183.500      .238     10751.0
   183.800      .396     13425.0
   184.000     1.028     15337.0
         Peak Outflow   =      .023 c.m/s
         Maximum Depth  =   183.132 metres
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          Maximum Storage =    7762. c.m                          35     COMMENT
                 .179     2.924      .023      .000 c.m/s                 3    line(s) of comment
17      COMBINE                                                          ***********
        2     Junction Node No.                                         REALIGNED CHANNEL - SEGMENT 3
                 .179     2.924      .023      .023 c.m/s                ***********
14      START                                                    4      CATCHMENT
        1     1=Zero; 2=Define                                          300.000     ID No.6 99999
35      COMMENT                                                           3.180     Area in hectares
        3    line(s) of comment                                        146.000     Length (PERV) metres
        **********************                                            .200     Gradient (%)
        EXISTING AREA ON QUAKER RD, EAST OF RICE RD                      15.000     Per cent Impervious
        **********************                                         146.000     Length (IMPERV)
4       CATCHMENT                                                         .000     %Imp. with Zero Dpth
         5.000     ID No.6 99999                                            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         1.870     Area in hectares                                        .250     Manning "n"
       112.000     Length (PERV) metres                                 74.000     SCS Curve No or C
         1.000     Gradient (%)                                           .100     Ia/S Coefficient
        50.000     Per cent Impervious                                   8.924     Initial Abstraction
       112.000     Length (IMPERV)                                          1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .000     %Imp. with Zero Dpth                                     .119     6.402     .816      .000 c.m/s
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat      .308     .910      .399      C perv/imperv/total
          .250     Manning "n"                                     15     ADD RUNOFF
        74.000     SCS Curve No or C                                        .119     6.521     .816      .000 c.m/s
          .100     Ia/S Coefficient                               4      CATCHMENT
         8.924     Initial Abstraction                                   301.000     ID No.6 99999
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  .720     Area in hectares
          .211      .000      .023      .023 c.m/s                       69.000     Length (PERV) metres
          .308      .900      .604      C perv/imperv/total                .200     Gradient (%)
15      ADD RUNOFF                                                       10.000     Per cent Impervious
          .211      .211      .023      .023 c.m/s                       69.000     Length (IMPERV)
9       ROUTE                                                             .000     %Imp. with Zero Dpth
          .000     Conduit Length                                           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .000     No Conduit defined                                     .250     Manning "n"
          .000     Zero lag                                             74.000     SCS Curve No or C
          .000     Beta weighting factor                                 .100     Ia/S Coefficient
          .000     Routing timestep                                     8.924     Initial Abstraction
            0     No. of sub-reaches                                        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .211      .211      .211      .023 c.m/s                         .020     6.521     .816      .000 c.m/s
17      COMBINE                                                           .308     .892      .367      C perv/imperv/total
        2     Junction Node No.                                   15     ADD RUNOFF
          .211      .211      .211      .217 c.m/s                         .020     6.541     .816      .000 c.m/s
18      CONFLUENCE                                               9      ROUTE
        2     Junction Node No.                                           .000     Conduit Length
          .211      .217      .211      .000 c.m/s                        .000     No Conduit defined
35      COMMENT                                                           .000     Zero lag
        3    line(s) of comment                                          .000     Beta weighting factor
        **********************                                           .000     Routing timestep
        EXISTING AREA ON QUAKER RD, EAST OF RICE RD                         0     No. of sub-reaches
        **********************                                            .020     6.541     6.541      .000 c.m/s
4       CATCHMENT                                                17     COMBINE
         6.000     ID No.6 99999                                          1     Junction Node No.
         1.920     Area in hectares                                        .020     6.541     6.541     6.541 c.m/s
       113.000     Length (PERV) metres                          14     START
          .200     Gradient (%)                                           1     1=Zero; 2=Define
        65.000     Per cent Impervious                           35     COMMENT
       113.000     Length (IMPERV)                                        3    line(s) of comment
          .000     %Imp. with Zero Dpth                                  ***********
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat    PROP DEVELOPMENT NORTH OF SEGMENT 3 - POND P30
          .250     Manning "n"                                           ***********
        74.000     SCS Curve No or C                              4      CATCHMENT
          .100     Ia/S Coefficient                                     30.000     ID No.6 99999
         8.470     Initial Abstraction                                   8.470     Area in hectares
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv 238.000   Length (PERV) metres
          .279      .217      .211      .000 c.m/s                        .200     Gradient (%)
          .308      .906      .697      C perv/imperv/total               .100     Per cent Impervious
15      ADD RUNOFF                                                      238.000     Length (IMPERV)
          .279      .486      .211      .000 c.m/s                        .000     %Imp. with Zero Dpth
35      COMMENT                                                             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        3    line(s) of comment                                          .250     Manning "n"
        ***********                                                    74.000     SCS Curve No or C
        FIRST AVE FROM QUAKER RD TO CITY OF WELLAND MUNICIPAL BOUNDA      .100     Ia/S Coefficient
        ***********                                                     8.924     Initial Abstraction
4       CATCHMENT                                                           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
       201.000     ID No.6 99999                                          .113      .000     6.541     6.541 c.m/s
         2.430     Area in hectares                                       .308     .906      .309      C perv/imperv/total
       127.000     Length (PERV) metres                          15     ADD RUNOFF
         1.000     Gradient (%)                                            .113      .113     6.541     6.541 c.m/s
        65.000     Per cent Impervious                            4      CATCHMENT
       127.000     Length (IMPERV)                                       31.000     ID No.6 99999
          .000     %Imp. with Zero Dpth                                 10.420     Area in hectares
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat   264.000     Length (PERV) metres
          .250     Manning "n"                                          1.000     Gradient (%)
        74.000     SCS Curve No or C                                    75.000     Per cent Impervious
          .100     Ia/S Coefficient                                    264.000     Length (IMPERV)
         8.924     Initial Abstraction                                   .000     %Imp. with Zero Dpth
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .344      .486      .211      .000 c.m/s                        .250     Manning "n"
          .308      .898      .692      C perv/imperv/total             74.000     SCS Curve No or C
15      ADD RUNOFF                                                        .100     Ia/S Coefficient
          .344      .816      .211      .000 c.m/s                       8.924     Initial Abstraction
9       ROUTE                                                               1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .000     Conduit Length                                       1.743      .113     6.541     6.541 c.m/s
          .000     No Conduit defined                                    .308     .907      .758      C perv/imperv/total
          .000     Zero lag                                       15     ADD RUNOFF
          .000     Beta weighting factor                                1.743     1.763     6.541     6.541 c.m/s
          .000     Routing timestep                               27     HYDROGRAPH DISPLAY
            0     No. of sub-reaches                                     5    is # of Hyeto/Hydrograph chosen
          .344      .816      .816      .000 c.m/s                       Volume  = .6276292E+04 c.m
17      COMBINE                                                  4      CATCHMENT
        1     Junction Node No.                                         32.000     ID No.6 99999
          .344      .816      .816     6.402 c.m/s                        .690     Area in hectares
35      COMMENT                                                         68.000     Length (PERV) metres
        3    line(s) of comment                                         1.000     Gradient (%)
        ***********************                                        60.000     Per cent Impervious
        FLOW D/S OF FIRST AVE CULVERT - OUTLET C                       68.000     Length (IMPERV)
        ***********************                                          .000     %Imp. with Zero Dpth
18      CONFLUENCE                                                          1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        1     Junction Node No.                                          .250     Manning "n"
          .344     6.402      .816      .000 c.m/s                      74.000     SCS Curve No or C
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          .100      Ia/S Coefficient                               .100      Ia/S Coefficient
         8.924      Initial Abstraction                           8.924      Initial Abstraction
             1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv      1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .102     1.763      6.541      6.541 c.m/s             .043     6.606      .107      .000 c.m/s
              .308      .898       .662    C perv/imperv/total      .308      .901      .368    C perv/imperv/total
15     ADD RUNOFF                                         35    COMMENT
              .102     1.840      6.541      6.541 c.m/s      3    line(s) of comment
27     HYDROGRAPH DISPLAY                                       ***************************
       5     is # of Hyeto/Hydrograph chosen                     FLOW U/S OF NIAGARA ST CULVERT - OUTLET D
       Volume  =  .6549078E+04 c.m                               ***************************
10     POND                                              15    ADD RUNOFF
       5 Depth - Discharge - Volume sets                            .043     6.649      .107      .000 c.m/s
        178.800      .000        .0                       14    START
        179.300     .0260      1520.0                      1    1=Zero; 2=Define
        180.100     .0440      4649.0
        180.600      .414       7069.0
        180.800     1.204      8137.0
        Peak Outflow    =      .114 c.m/s
        Maximum Depth   =    180.194 metres
        Maximum Storage =     5104. c.m
              .102     1.840       .114      6.541 c.m/s
17     COMBINE
       1     Junction Node No.
              .102     1.840       .114      6.569 c.m/s
14     START
       1     1=Zero; 2=Define
35     COMMENT
       3    line(s) of comment
       ***********
       PROP DEVELOPMENT SOUTH OF SEGMENT 3 - POND P31
       ***********
 4     CATCHMENT
        33.000      ID No.ó 99999
        12.960      Area in hectares
       294.000      Length (PERV) metres
         1.000      Gradient (%)
        75.000      Per cent Impervious
       294.000      Length (IMPERV)
          .000      %Imp. with Zero Dpth
             1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250      Manning "n"
        74.000      SCS Curve No or C
          .100      Ia/S Coefficient
         8.924      Initial Abstraction
             1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              2.171      .000       .114      6.569 c.m/s
               .308      .910       .759    C perv/imperv/total
15     ADD RUNOFF
              2.171     2.171       .114      6.569 c.m/s
27     HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
       Volume  =  .5876996E+04 c.m
 4     CATCHMENT
        34.000      ID No.ó 99999
          .660      Area in hectares
        66.000      Length (PERV) metres
         1.000      Gradient (%)
        60.000      Per cent Impervious
        66.000      Length (IMPERV)
          .000      %Imp. with Zero Dpth
             1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250      Manning "n"
        74.000      SCS Curve No or C
          .100      Ia/S Coefficient
         8.924      Initial Abstraction
             1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .098     2.171       .114      6.569 c.m/s
               .308      .898       .662    C perv/imperv/total
15     ADD RUNOFF
               .098     2.245       .114      6.569 c.m/s
27     HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
       Volume  =  .6138025E+04 c.m
10     POND
       6 Depth - Discharge - Volume sets
        178.300      .000        .0
        178.900     .0350      1927.0
        179.600     .0540      4692.0
        179.800      .150       5590.0
        180.000      .321       6538.0
        180.300     1.922      8059.0
        Peak Outflow    =      .107 c.m/s
        Maximum Depth   =    179.709 metres
        Maximum Storage =     5183. c.m
               .098     2.245       .107      6.569 c.m/s
17     COMBINE
       1     Junction Node No.
               .098     2.245       .107      6.606 c.m/s
14     START
       1     1=Zero; 2=Define
18     CONFLUENCE
       1     Junction Node No.
               .098     6.606       .107      .000 c.m/s
35     COMMENT
       3    line(s) of comment
       ***********************
       REALIGNED CHANNEL - SEGMENT 3
       ***********************
 4     CATCHMENT
       302.000      ID No.ó 99999
         1.610      Area in hectares
       104.000      Length (PERV) metres
          .200      Gradient (%)
        10.000      Per cent Impervious
       104.000      Length (IMPERV)
          .000      %Imp. with Zero Dpth
             1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250      Manning "n"
        74.000      SCS Curve No or C
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35    COMMENT                                                82.000    Length (PERV) metres
   3    line(s) of comment                                 1.000    Gradient (%)
      ****************************************************  10.000    Per cent Impervious
      100-YEAR STORM EVENT                                 82.000    Length (IMPERV)
      ****************************************************    .000    %Imp. with Zero Dpth
 2    STORM                                                     1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic      .250    Manning "n"
1020.000    Coefficient  a                                74.000    SCS Curve No or C
   4.700    Constant  b   (min)                             .100    Ia/S Coefficient
    .731    Exponent  c                                    8.924    Initial Abstraction
    .450    Fraction to peak  r                                 1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
 240.000    Duration δ  240 min                               .054     .735     1.832      1.832 c.m/s
      73.203 mm     Total depth                               .367     .912     .422    C perv/imperv/total
 3    IMPERVIOUS                                        15    ADD RUNOFF
      1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat   .054     .783     1.832      1.832 c.m/s
    .015    Manning "n"                                 10    POND
  98.000    SCS Curve No or C                                6 Depth - Discharge - Volume sets
    .100    Ia/S Coefficient                              184.800     .000         .0
    .518    Initial Abstraction                           185.750     .0210       1.0
35    COMMENT                                              186.000     .0230     503.0
   3    line(s) of comment                                186.250     .0260    1091.0
      ******************                                  186.500     .0280    1765.0
      EXISTING RES. WEST OF SEGMENT 1                      186.700    1.244    2370.0
      ******************                                  Peak Outflow   =     .105 c.m/s
 4    CATCHMENT                                            Maximum Depth  =  186.513 metres
   1.000    ID No.δ 99999                                  Maximum Storage =   1804. c.m
  17.520    Area in hectares                                  .054     .783     .105      1.832 c.m/s
 343.000    Length (PERV) metres                          17    COMBINE
   1.000    Gradient (%)                                       1    Junction Node No.
  35.000    Per cent Impervious                                .054     .783     .105      1.857 c.m/s
 343.000    Length (IMPERV)                               14    START
    .000    %Imp. with Zero Dpth                               1    1=Zero; 2=Define
      1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  18    CONFLUENCE
    .250    Manning "n"                                        1    Junction Node No.
  74.000    SCS Curve No or C                                  .054    1.857     .105      .000 c.m/s
    .100    Ia/S Coefficient                              35    COMMENT
   8.924    Initial Abstraction                              3    line(s) of comment
      1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv   ****************
      1.731     .000     .000      .000 c.m/s               REALIGNED CHANNEL - SEGMENT 1
       .368     .925     .563    C perv/imperv/total        ****************
15    ADD RUNOFF                                           4    CATCHMENT
      1.731    1.731     .000      .000 c.m/s            101.000    ID No.δ 99999
35    COMMENT                                              .610    Area in hectares
   3    line(s) of comment                                64.000    Length (PERV) metres
      ******************                                  1.000    Gradient (%)
      REALIGNED CHANNEL - SEGMENT 1                       10.000    Per cent Impervious
      ******************                                  64.000    Length (IMPERV)
 4    CATCHMENT                                             .000    %Imp. with Zero Dpth
 100.000    ID No.δ 99999                                       1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
   2.020    Area in hectares                                .250    Manning "n"
 116.000    Length (PERV) metres                          74.000    SCS Curve No or C
    .400    Gradient (%)                                    .100    Ia/S Coefficient
  15.000    Per cent Impervious                            8.924    Initial Abstraction
 116.000    Length (IMPERV)                                     1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
    .000    %Imp. with Zero Dpth                               .038    1.857     .105      .000 c.m/s
      1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat   .367     .914     .422    C perv/imperv/total
    .250    Manning "n"                                 15    ADD RUNOFF
  74.000    SCS Curve No or C                                  .038    1.890     .105      .000 c.m/s
    .100    Ia/S Coefficient                              9    ROUTE
   8.924    Initial Abstraction                              .000    Conduit Length
      1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv   .000    No Conduit defined
       .101    1.731     .000      .000 c.m/s               .000    Zero lag
       .368     .905     .448    C perv/imperv/total        .000    Beta weighting factor
35    COMMENT                                               .000    Routing timestep
   3    line(s) of comment                                    0    No. of sub-reaches
      ******************                                      .038    1.890    1.890      .000 c.m/s
      FLOW AT FUT ROADWAY CULVERT - SEGMENT 1            17    COMBINE
      ******************                                      1    Junction Node No.
15    ADD RUNOFF                                              .038    1.890    1.890      1.890 c.m/s
       .101    1.832     .000      .000 c.m/s           14    START
 9    ROUTE                                                    1    1=Zero; 2=Define
    .000    Conduit Length                               35    COMMENT
    .000    No Conduit defined                              3    line(s) of comment
    .000    Zero lag                                          ******************
    .000    Beta weighting factor                            PROP DEVELOPMENT SOUTH OF SEGMENT 1 - POND P11
    .000    Routing timestep                                 ******************
      0    No. of sub-reaches                            4    CATCHMENT
       .101    1.832    1.832      .000 c.m/s             12.000    ID No.δ 99999
17    COMBINE                                             2.680    Area in hectares
      1    Junction Node No.                           134.000    Length (PERV) metres
       .101    1.832    1.832      1.832 c.m/s            1.000    Gradient (%)
14    START                                              35.000    Per cent Impervious
      1    1=Zero; 2=Define                            134.000    Length (IMPERV)
35    COMMENT                                              .000    %Imp. with Zero Dpth
   3    line(s) of comment                                    1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      ******************                                  .250    Manning "n"
      PROP DEVELOPMENT NORTH OF SEGMENT 1 - POND P10     74.000    SCS Curve No or C
      ******************                                  .100    Ia/S Coefficient
 4    CATCHMENT                                           8.924    Initial Abstraction
  10.000    ID No.δ 99999                                       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
   4.050    Area in hectares                               .262     .000    1.890      1.890 c.m/s
 164.000    Length (PERV) metres                           .367     .914     .559    C perv/imperv/total
   1.000    Gradient (%)                                15    ADD RUNOFF
  70.000    Per cent Impervious                              .262     .262    1.890      1.890 c.m/s
 164.000    Length (IMPERV)                               4    CATCHMENT
    .000    %Imp. with Zero Dpth                          13.000    ID No.δ 99999
      1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat   6.980    Area in hectares
    .250    Manning "n"                                216.000    Length (PERV) metres
  74.000    SCS Curve No or C                             1.000    Gradient (%)
    .100    Ia/S Coefficient                             70.000    Per cent Impervious
   8.924    Initial Abstraction                         216.000    Length (IMPERV)
      1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv   .000    %Imp. with Zero Dpth
       .735     .000    1.832      1.832 c.m/s                 1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .367     .909     .747    C perv/imperv/total      .250    Manning "n"
15    ADD RUNOFF                                         74.000    SCS Curve No or C
       .735     .735    1.832      1.832 c.m/s             .100    Ia/S Coefficient
 4    CATCHMENT                                           8.924    Initial Abstraction
  11.000    ID No.δ 99999                                       1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
   1.000    Area in hectares                             1.307     .262    1.890      1.890 c.m/s
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            .368         .908         .746      C perv/imperv/total
15     ADD RUNOFF
             1.307        1.567        1.890        1.890 c.m/s
 4     CATCHMENT
        14.000      ID No.ó 99999
          .670      Area in hectares
        67.000      Length (PERV) metres
         1.000      Gradient (%)
        60.000      Per cent Impervious
        67.000      Length (IMPERV)
          .000      %Imp. with Zero Dpth
             1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250      Manning "n"
        74.000      SCS Curve No or C
          .100      Ia/S Coefficient
         8.924      Initial Abstraction
             1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .124        1.567        1.890        1.890 c.m/s
              .367         .914         .695      C perv/imperv/total
15     ADD RUNOFF
              .124        1.659        1.890        1.890 c.m/s
27     HYDROGRAPH DISPLAY
         5     is # of Hyeto/Hydrograph chosen
       Volume  = .5247869E+04 c.m
10     POND
       5 Depth - Discharge - Volume sets
       184.800        .000         .0
       185.300        .0140      1142.0
       186.100        .0240      3519.0
       186.500        .287       4978.0
       186.800       1.922       6222.0
       Peak Outflow    =      .143 c.m/s
       Maximum Depth   =    186.281 metres
       Maximum Storage =     4180. c.m
              .124        1.659         .143        1.890 c.m/s
35     COMMENT
         3     line(s) of comment
       *****************
       FLOW U/S OF RICE RD CULVERT - OUTLET A1
       *****************
17     COMBINE
         1     Junction Node No.
              .124        1.659         .143        1.908 c.m/s
14     START
         1     1=Zero; 2=Define
35     COMMENT
         3     line(s) of comment
       **********************
       PROP DEVELOPMENT SOUTH OF QUAKER RD & WEST OF RICE RD. - PON
       **********************
 4     CATCHMENT
        40.000      ID No.ó 99999
         8.210      Area in hectares
       234.000      Length (PERV) metres
         1.000      Gradient (%)
        25.000      Per cent Impervious
       234.000      Length (IMPERV)
          .000      %Imp. with Zero Dpth
             1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250      Manning "n"
        74.000      SCS Curve No or C
          .100      Ia/S Coefficient
         8.924      Initial Abstraction
             1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .607        .000         .143        1.908 c.m/s
              .367         .911         .503      C perv/imperv/total
15     ADD RUNOFF
              .607         .607         .143        1.908 c.m/s
 9     ROUTE
          .000      Conduit Length
          .000      No Conduit defined
          .000      Zero lag
          .000      Beta weighting factor
          .000      Routing timestep
             0      No. of sub-reaches
              .607         .607         .607        1.908 c.m/s
17     COMBINE
         2     Junction Node No.
              .607         .607         .607         .607 c.m/s
14     START
         1     1=Zero; 2=Define
 4     CATCHMENT
        41.000      ID No.ó 99999
          .690      Area in hectares
        68.000      Length (PERV) metres
         1.000      Gradient (%)
        35.000      Per cent Impervious
        68.000      Length (IMPERV)
          .000      %Imp. with Zero Dpth
             1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250      Manning "n"
        74.000      SCS Curve No or C
          .100      Ia/S Coefficient
         8.924      Initial Abstraction
             1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .078        .000         .607         .607 c.m/s
              .367         .914         .559      C perv/imperv/total
15     ADD RUNOFF
              .078         .078         .607         .607 c.m/s
 4     CATCHMENT
        42.000      ID No.ó 99999
        12.640      Area in hectares
       290.000      Length (PERV) metres
         1.000      Gradient (%)
        70.000      Per cent Impervious
       290.000      Length (IMPERV)
          .000      %Imp. with Zero Dpth
             1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250      Manning "n"
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        74.000      SCS Curve No or C
          .100      Ia/S Coefficient
         8.924      Initial Abstraction
             1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             2.409        .078         .607         .607 c.m/s
              .368         .921         .755      C perv/imperv/total
15     ADD RUNOFF
             2.409        2.475         .607         .607 c.m/s
 9     ROUTE
          .000      Conduit Length
          .000      No Conduit defined
          .000      Zero lag
          .000      Beta weighting factor
          .000      Routing timestep
             0      No. of sub-reaches
             2.409        2.475        2.475         .607 c.m/s
17     COMBINE
         2     Junction Node No.
             2.409        2.475        2.475        3.082 c.m/s
14     START
         1     1=Zero; 2=Define
 4     CATCHMENT
        43.000      ID No.ó 99999
          .330      Area in hectares
        47.000      Length (PERV) metres
         1.000      Gradient (%)
        35.000      Per cent Impervious
        47.000      Length (IMPERV)
          .000      %Imp. with Zero Dpth
             1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250      Manning "n"
        74.000      SCS Curve No or C
          .100      Ia/S Coefficient
         8.924      Initial Abstraction
             1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .039        .000        2.475        3.082 c.m/s
              .367         .911         .557      C perv/imperv/total
15     ADD RUNOFF
              .039         .039        2.475        3.082 c.m/s
 4     CATCHMENT
        44.000      ID No.ó 99999
         6.400      Area in hectares
       207.000      Length (PERV) metres
         1.000      Gradient (%)
        70.000      Per cent Impervious
       207.000      Length (IMPERV)
          .000      %Imp. with Zero Dpth
             1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250      Manning "n"
        74.000      SCS Curve No or C
          .100      Ia/S Coefficient
         8.924      Initial Abstraction
             1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.193        .039        2.475        3.082 c.m/s
              .368         .906         .744      C perv/imperv/total
15     ADD RUNOFF
             1.193        1.226        2.475        3.082 c.m/s
 9     ROUTE
          .000      Conduit Length
          .000      No Conduit defined
          .000      Zero lag
          .000      Beta weighting factor
          .000      Routing timestep
             0      No. of sub-reaches
             1.193        1.226        1.226        3.082 c.m/s
17     COMBINE
         2     Junction Node No.
             1.193        1.226        1.226        4.308 c.m/s
14     START
         1     1=Zero; 2=Define
18     CONFLUENCE
         2     Junction Node No.
             1.193        4.308        1.226         .000 c.m/s
 4     CATCHMENT
        45.000      ID No.ó 99999
         1.030      Area in hectares
        83.000      Length (PERV) metres
         1.000      Gradient (%)
        60.000      Per cent Impervious
        83.000      Length (IMPERV)
          .000      %Imp. with Zero Dpth
             1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250      Manning "n"
        74.000      SCS Curve No or C
          .100      Ia/S Coefficient
         8.924      Initial Abstraction
             1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .184        4.308        1.226         .000 c.m/s
              .367         .912         .694      C perv/imperv/total
15     ADD RUNOFF
              .184        4.453        1.226         .000 c.m/s
27     HYDROGRAPH DISPLAY
         5     is # of Hyeto/Hydrograph chosen
       Volume  = .1443723E+05 c.m
10     POND
       6 Depth - Discharge - Volume sets
       186.000        .000         .0
       186.800        .0550      4048.0
       187.300        .0730      7091.0
       187.500        .170       8424.0
       187.800        .257      10552.0
       188.000        .880      12094.0
       Peak Outflow    =      .430 c.m/s
       Maximum Depth   =    187.856 metres
       Maximum Storage =    10981. c.m
              .184        4.453         .430         .000 c.m/s
17     COMBINE
         2     Junction Node No.
              .184        4.453         .430         .430 c.m/s
```

```
14    START
 1     1=Zero; 2=Define
35    COMMENT
 3     line(s) of comment
       ************************
       EXISTING AREA ON QUAKER RD, WEST OF RICE RD
       ************************
 4    CATCHMENT
    2.000     ID No.ó 99999
    9.020     Area in hectares
  245.000     Length (PERV) metres
    1.000     Gradient (%)
   40.000     Per cent Impervious
  245.000     Length (IMPERV)
     .000     %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250     Manning "n"
   74.000     SCS Curve No or C
     .100     Ia/S Coefficient
    8.924     Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          1.013     .000     .430      .430 c.m/s
           .368     .912     .586      C perv/imperv/total
15    ADD RUNOFF
          1.013    1.013     .430      .430 c.m/s
 9    ROUTE
     .000     Conduit Length
     .000     No Conduit defined
     .000     Zero lag
     .000     Beta weighting factor
     .000     Routing timestep
        0     No. of sub-reaches
          1.013    1.013    1.013      .430 c.m/s
17    COMBINE
        2     Junction Node No.
          1.013    1.013    1.013     1.074 c.m/s
14    START
 1     1=Zero; 2=Define
18    CONFLUENCE
        2     Junction Node No.
          1.013    1.074    1.013      .000 c.m/s
35    COMMENT
 3     line(s) of comment
       ************************
       EXISTING AREA ON QUAKER RD, WEST OF RICE RD
       ************************
 4    CATCHMENT
    3.000     ID No.ó 99999
    5.680     Area in hectares
  195.000     Length (PERV) metres
    1.000     Gradient (%)
   40.000     Per cent Impervious
  195.000     Length (IMPERV)
     .000     %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250     Manning "n"
   74.000     SCS Curve No or C
     .100     Ia/S Coefficient
    8.924     Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .632    1.074    1.013      .000 c.m/s
           .367     .903     .582      C perv/imperv/total
15    ADD RUNOFF
           .632    1.706    1.013      .000 c.m/s
 9    ROUTE
     .000     Conduit Length
     .000     No Conduit defined
     .000     Zero lag
     .000     Beta weighting factor
     .000     Routing timestep
        0     No. of sub-reaches
           .632    1.706    1.706      .000 c.m/s
17    COMBINE
        2     Junction Node No.
           .632    1.706    1.706     1.706 c.m/s
14    START
 1     1=Zero; 2=Define
35    COMMENT
 3     line(s) of comment
       ************************
       PROP DEVELOPMENT SOUTH OF QUAKER RD, EAST OF RICE RD
       ************************
 4    CATCHMENT
   50.000     ID No.ó 99999
    3.420     Area in hectares
  151.000     Length (PERV) metres
    1.000     Gradient (%)
   10.000     Per cent Impervious
  151.000     Length (IMPERV)
     .000     %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250     Manning "n"
   74.000     SCS Curve No or C
     .100     Ia/S Coefficient
    8.924     Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .148     .000    1.706     1.706 c.m/s
           .367     .912     .422      C perv/imperv/total
15    ADD RUNOFF
           .148     .148    1.706     1.706 c.m/s
 4    CATCHMENT
   51.000     ID No.ó 99999
    1.980     Area in hectares
  115.000     Length (PERV) metres
    1.000     Gradient (%)
   10.000     Per cent Impervious
  115.000     Length (IMPERV)
     .000     %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat

     .250     Manning "n"
   74.000     SCS Curve No or C
     .100     Ia/S Coefficient
    8.924     Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .092     .148    1.706     1.706 c.m/s
           .368     .916     .422      C perv/imperv/total
15    ADD RUNOFF
           .092     .240    1.706     1.706 c.m/s
 9    ROUTE
     .000     Conduit Length
     .000     No Conduit defined
     .000     Zero lag
     .000     Beta weighting factor
     .000     Routing timestep
        0     No. of sub-reaches
           .092     .240     .240     1.706 c.m/s
17    COMBINE
        2     Junction Node No.
           .092     .240     .240     1.925 c.m/s
14    START
 1     1=Zero; 2=Define
35    COMMENT
 3     line(s) of comment
       ************************
       EXISTING AREA WEST OF RICE RD AND SOUTH OF QUAKER ROAD
       ************************
 4    CATCHMENT
    4.000     ID No.ó 99999
   13.940     Area in hectares
  305.000     Length (PERV) metres
    1.000     Gradient (%)
   40.000     Per cent Impervious
  305.000     Length (IMPERV)
     .000     %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250     Manning "n"
   74.000     SCS Curve No or C
     .100     Ia/S Coefficient
    8.924     Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          1.566     .000     .240     1.925 c.m/s
           .367     .923     .590      C perv/imperv/total
15    ADD RUNOFF
          1.566    1.566     .240     1.925 c.m/s
 9    ROUTE
     .000     Conduit Length
     .000     No Conduit defined
     .000     Zero lag
     .000     Beta weighting factor
     .000     Routing timestep
        0     No. of sub-reaches
          1.566    1.566    1.566     1.925 c.m/s
17    COMBINE
        2     Junction Node No.
          1.566    1.566    1.566     3.491 c.m/s
14    START
 1     1=Zero; 2=Define
18    CONFLUENCE
        2     Junction Node No.
          1.566    3.491    1.566      .000 c.m/s
35    COMMENT
 3     line(s) of comment
       *****************
       RICE ROAD FROM QUAKER RD TO CITY OF WELLAND MUNICIPAL BOUNDA
       *****************
 4    CATCHMENT
  501.000     ID No.ó 99999
    1.570     Area in hectares
  102.000     Length (PERV) metres
    1.000     Gradient (%)
   70.000     Per cent Impervious
  102.000     Length (IMPERV)
     .000     %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250     Manning "n"
   74.000     SCS Curve No or C
     .100     Ia/S Coefficient
    8.924     Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .314    3.491    1.566      .000 c.m/s
           .367     .915     .751      C perv/imperv/total
15    ADD RUNOFF
           .314    3.754    1.566      .000 c.m/s
 9    ROUTE
     .000     Conduit Length
     .000     No Conduit defined
     .000     Zero lag
     .000     Beta weighting factor
     .000     Routing timestep
        0     No. of sub-reaches
           .314    3.754    3.754      .000 c.m/s
35    COMMENT
 3     line(s) of comment
       *****************
       FLOW D/S OF RICE RD CULVERT - OUTLET A2
       *****************
17    COMBINE
        1     Junction Node No.
           .314    3.754    3.754     5.662 c.m/s
14    START
 1     1=Zero; 2=Define
35    COMMENT
 3     line(s) of comment
       *****************
       PROP DEVELOPMENT SOUTH OF QUAKER RD - QUALLITY CONTROL ONLY
       *****************
 4    CATCHMENT
   20.100     ID No.ó 99999
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      .780      Area in hectares                         35    COMMENT
    72.000      Length (PERV) metres                           3   line(s) of comment
     1.000      Gradient (%)                                   ***********************
    35.000      Per cent Impervious                            FLOW U/S OF FIRST AVE CULVERT
    72.000      Length (IMPERV)                                ***********************
      .000      %Imp. with Zero Dpth                     17    COMBINE
         1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat   1    Junction Node No.
      .250      Manning "n"                                      .559     6.890     6.890     6.890 c.m/s
    74.000      SCS Curve No or C                        14    START
      .100      Ia/S Coefficient                               1    1=Zero; 2=Define
     8.924      Initial Abstraction                      35    COMMENT
         1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv   3   line(s) of comment
      .087      .000     3.754     5.662 c.m/s                  ***********
      .366      .914      .558     C perv/imperv/total          PROP DEVELOPMENT SOUTH OF QUAKER, EAST OF RICE - POND P50
15    ADD RUNOFF                                               ***********
      .087      .087     3.754     5.662 c.m/s            4    CATCHMENT
 4    CATCHMENT                                             52.000      ID No.ó 99999
    20.000      ID No.ó 99999                                6.430      Area in hectares
     3.210      Area in hectares                          207.000      Length (PERV) metres
   146.000      Length (PERV) metres                         1.000      Gradient (%)
     1.000      Gradient (%)                                70.000      Per cent Impervious
    85.000      Per cent Impervious                        207.000      Length (IMPERV)
   146.000      Length (IMPERV)                                .000      %Imp. with Zero Dpth
      .000      %Imp. with Zero Dpth                              1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat   .250      Manning "n"
      .250      Manning "n"                                  74.000      SCS Curve No or C
    74.000      SCS Curve No or C                              .100      Ia/S Coefficient
      .100      Ia/S Coefficient                             8.924      Initial Abstraction
     8.924      Initial Abstraction                               1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv   1.198      .000     6.890     6.890 c.m/s
      .720      .087     3.754     5.662 c.m/s                  .368      .906      .744     C perv/imperv/total
      .368      .913      .831     C perv/imperv/total    15    ADD RUNOFF
15    ADD RUNOFF                                             1.198     1.198     6.890     6.890 c.m/s
      .720      .807     3.754     5.662 c.m/s             9    ROUTE
 9    ROUTE                                                    .000      Conduit Length
      .000      Conduit Length                                 .000      No Conduit defined
      .000      No Conduit defined                             .000      Zero lag
      .000      Zero lag                                       .000      Beta weighting factor
      .000      Beta weighting factor                          .000      Routing timestep
      .000      Routing timestep                                 0      No. of sub-reaches
         0      No. of sub-reaches                           1.198     1.198     1.198     6.890 c.m/s
      .720      .807      .807     5.662 c.m/s           17    COMBINE
17    COMBINE                                                  2    Junction Node No.
      1    Junction Node No.                                 1.198     1.198     1.198     1.198 c.m/s
      .720      .807      .807     6.417 c.m/s           14    START
14    START                                                   1    1=Zero; 2=Define
      1    1=Zero; 2=Define                               4    CATCHMENT
18    CONFLUENCE                                             53.000      ID No.ó 99999
      1    Junction Node No.                                11.340      Area in hectares
      .720     6.417      .807      .000 c.m/s            275.000      Length (PERV) metres
35    COMMENT                                                1.000      Gradient (%)
      3   line(s) of comment                               70.000      Per cent Impervious
      *****************                                   275.000      Length (IMPERV)
      REALIGNED CHANNEL - SEGMENT 2                           .000      %Imp. with Zero Dpth
      *****************                                          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
 4    CATCHMENT                                                .250      Manning "n"
   200.000      ID No.ó 99999                               74.000      SCS Curve No or C
      .970      Area in hectares                               .100      Ia/S Coefficient
    80.416      Length (PERV) metres                         8.924      Initial Abstraction
     1.000      Gradient (%)                                      1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
    10.000      Per cent Impervious                          2.157      .000     1.198     1.198 c.m/s
    80.416      Length (IMPERV)                                .368      .919      .753     C perv/imperv/total
      .000      %Imp. with Zero Dpth                     15    ADD RUNOFF
         1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat   2.157     2.157     1.198     1.198 c.m/s
      .250      Manning "n"                                9    ROUTE
    74.000      SCS Curve No or C                              .000      Conduit Length
      .100      Ia/S Coefficient                               .000      No Conduit defined
     8.924      Initial Abstraction                            .000      Zero lag
         1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv   .000      Beta weighting factor
      .053     6.417      .807      .000 c.m/s                  .000      Routing timestep
      .367      .912      .422     C perv/imperv/total            0      No. of sub-reaches
35    COMMENT                                                2.157     2.157     2.157     1.198 c.m/s
      3   line(s) of comment                            17    COMBINE
      *****************                                       2    Junction Node No.
      FLOW D/S OF AREA A20 - OUTLET B                        2.157     2.157     2.157     3.355 c.m/s
      *****************                                 18    CONFLUENCE
15    ADD RUNOFF                                               2    Junction Node No.
      .053     6.464      .807      .000 c.m/s                2.157     3.355     2.157      .000 c.m/s
35    COMMENT                                             4    CATCHMENT
      3   line(s) of comment                               54.000      ID No.ó 99999
      ***********************                              1.280      Area in hectares
      EX RES. AND FUT DEVELOPMENT LANDS BY OTHERS WEST OF FIRST AV   92.000      Length (PERV) metres
      ***********************                              1.000      Gradient (%)
 4    CATCHMENT                                             60.000      Per cent Impervious
    21.000      ID No.ó 99999                               92.000      Length (IMPERV)
    35.460      Area in hectares                               .000      %Imp. with Zero Dpth
   487.000      Length (PERV) metres                              1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .200      Gradient (%)                                   .250      Manning "n"
     5.000      Per cent Impervious                         74.000      SCS Curve No or C
   487.000      Length (IMPERV)                                .100      Ia/S Coefficient
      .000      %Imp. with Zero Dpth                         8.924      Initial Abstraction
         1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat      1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
      .250      Manning "n"                                   .225     3.355     2.157      .000 c.m/s
    74.000      SCS Curve No or C                              .367      .913      .695     C perv/imperv/total
      .100      Ia/S Coefficient                         15    ADD RUNOFF
     8.924      Initial Abstraction                            .225     3.539     2.157      .000 c.m/s
         1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv   27    HYDROGRAPH DISPLAY
      .559     6.464      .807      .000 c.m/s                5    is # of Hyeto/Hydrograph chosen
      .368      .922      .395     C perv/imperv/total          Volume = .1040810E+05 c.m
15    ADD RUNOFF                                         10    POND
      .559     6.890      .807      .000 c.m/s                6 Depth - Discharge - Volume sets
 9    ROUTE                                                 182.000      .000      .0
      .000      Conduit Length                             182.800      .0190     5251.0
      .000      No Conduit defined                         183.150      .0230     7895.0
      .000      Zero lag                                   183.500      .238     10751.0
      .000      Beta weighting factor                      183.800      .396     13425.0
      .000      Routing timestep                           184.000     1.028     15337.0
         0      No. of sub-reaches                         Peak Outflow    =      .132 c.m/s
      .559     6.890     6.890      .000 c.m/s              Maximum Depth   =   183.327 metres
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        Maximum Storage =    9342. c.m                        35      COMMENT
                .225      3.539      .132      .000 c.m/s               3    line(s) of comment
17      COMBINE                                                        ***********
        2    Junction Node No.                                         REALIGNED CHANNEL - SEGMENT 3
                .225      3.539      .132      .132 c.m/s               ***********
14      START                                                  4       CATCHMENT
        1    1=Zero; 2=Define                                          300.000    ID No.6 99999
35      COMMENT                                                          3.180    Area in hectares
        3    line(s) of comment                                        146.000    Length (PERV) metres
        ***********************                                           .200    Gradient (%)
        EXISTING AREA ON QUAKER RD, EAST OF RICE RD                     15.000    Per cent Impervious
        ***********************                                        146.000    Length (IMPERV)
4       CATCHMENT                                                         .000    %Imp. with Zero Dpth
          5.000    ID No.6 99999                                           1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          1.870    Area in hectares                                        .250    Manning "n"
        112.000    Length (PERV) metres                                 74.000    SCS Curve No or C
          1.000    Gradient (%)                                            .100    Ia/S Coefficient
         50.000    Per cent Impervious                                    8.924    Initial Abstraction
        112.000    Length (IMPERV)                                          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .000    %Imp. with Zero Dpth                                        .148      7.881      .991      .000 c.m/s
             1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat          .368       .924      .451    C perv/imperv/total
           .250    Manning "n"                                    15      ADD RUNOFF
         74.000    SCS Curve No or C                                            .148      8.029      .991      .000 c.m/s
           .100    Ia/S Coefficient                               4       CATCHMENT
          8.924    Initial Abstraction                                   301.000    ID No.6 99999
             1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv    .720    Area in hectares
                .266      .000      .132      .132 c.m/s                 69.000    Length (PERV) metres
                .367      .916      .642    C perv/imperv/total            .200    Gradient (%)
15      ADD RUNOFF                                                      10.000    Per cent Impervious
                .266      .266      .132      .132 c.m/s                 69.000    Length (IMPERV)
9       ROUTE                                                             .000    %Imp. with Zero Dpth
           .000    Conduit Length                                           1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .000    No Conduit defined                                     .250    Manning "n"
           .000    Zero lag                                             74.000    SCS Curve No or C
           .000    Beta weighting factor                                  .100    Ia/S Coefficient
           .000    Routing timestep                                      8.924    Initial Abstraction
             0    No. of sub-reaches                                         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .266      .266      .266      .132 c.m/s                     .030      8.029      .991      .000 c.m/s
17      COMBINE                                                              .367       .911      .422    C perv/imperv/total
        2    Junction Node No.                              15      ADD RUNOFF
                .266      .266      .266      .274 c.m/s                     .030      8.057      .991      .000 c.m/s
18      CONFLUENCE                                           9       ROUTE
        2    Junction Node No.                                         .000    Conduit Length
                .266      .274      .266      .000 c.m/s                .000    No Conduit defined
35      COMMENT                                                        .000    Zero lag
        3    line(s) of comment                                        .000    Beta weighting factor
        ***********************                                        .000    Routing timestep
        EXISTING AREA ON QUAKER RD, EAST OF RICE RD                      0    No. of sub-reaches
        ***********************                                             .030      8.057      8.057      .000 c.m/s
4       CATCHMENT                                           17      COMBINE
          6.000    ID No.6 99999                                      1    Junction Node No.
          1.920    Area in hectares                                          .030      8.057      8.057      8.057 c.m/s
        113.000    Length (PERV) metres                         14      START
           .200    Gradient (%)                                          1    1=Zero; 2=Define
         65.000    Per cent Impervious                          35      COMMENT
        113.000    Length (IMPERV)                                      3    line(s) of comment
           .000    %Imp. with Zero Dpth                                 ***********
             1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  PROP DEVELOPMENT NORTH OF SEGMENT 3 - POND P30
           .250    Manning "n"                                          ***********
         74.000    SCS Curve No or C                            4       CATCHMENT
           .100    Ia/S Coefficient                                     30.000    ID No.6 99999
          8.924    Initial Abstraction                                   8.470    Area in hectares
             1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv  238.000    Length (PERV) metres
                .339      .274      .266      .000 c.m/s                 .200    Gradient (%)
                .368      .914      .723    C perv/imperv/total           .100    Per cent Impervious
15      ADD RUNOFF                                                    238.000    Length (IMPERV)
                .339      .594      .266      .000 c.m/s                 .000    %Imp. with Zero Dpth
35      COMMENT                                                           1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        3    line(s) of comment                                         .250    Manning "n"
        ***********                                                   74.000    SCS Curve No or C
        FIRST AVE FROM QUAKER RD TO CITY OF WELLAND MUNICIPAL BOUNDA    .100    Ia/S Coefficient
        ***********                                                    8.924    Initial Abstraction
4       CATCHMENT                                                          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
        201.000    ID No.6 99999                                            .188      .000      8.057      8.057 c.m/s
          2.430    Area in hectares                                         .368       .916      .368    C perv/imperv/total
        127.000    Length (PERV) metres                         15      ADD RUNOFF
          1.000    Gradient (%)                                             .188      .188      8.057      8.057 c.m/s
         65.000    Per cent Impervious                           4       CATCHMENT
        127.000    Length (IMPERV)                                      31.000    ID No.6 99999
           .000    %Imp. with Zero Dpth                                 10.420    Area in hectares
             1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat  264.000    Length (PERV) metres
           .250    Manning "n"                                          1.000    Gradient (%)
         74.000    SCS Curve No or C                                   75.000    Per cent Impervious
           .100    Ia/S Coefficient                                    264.000    Length (IMPERV)
          8.924    Initial Abstraction                                   .000    %Imp. with Zero Dpth
             1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv    1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
                .433      .594      .266      .000 c.m/s                 .250    Manning "n"
                .367      .915      .723    C perv/imperv/total        74.000    SCS Curve No or C
15      ADD RUNOFF                                                      .100    Ia/S Coefficient
                .433      .991      .266      .000 c.m/s               8.924    Initial Abstraction
9       ROUTE                                                            1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .000    Conduit Length                                        2.113      .188      8.057      8.057 c.m/s
           .000    No Conduit defined                                    .367       .917      .779    C perv/imperv/total
           .000    Zero lag                                      15      ADD RUNOFF
           .000    Beta weighting factor                                 2.113      2.151      8.057      8.057 c.m/s
           .000    Routing timestep                              27      HYDROGRAPH DISPLAY
             0    No. of sub-reaches                                   5    is # of Hyeto/Hydrograph chosen
                .433      .991      .991      .000 c.m/s                Volume =  .8226000E+04 c.m
17      COMBINE                                               4       CATCHMENT
        1    Junction Node No.                                         32.000    ID No.6 99999
                .433      .991      .991      7.881 c.m/s                .690    Area in hectares
35      COMMENT                                                       68.000    Length (PERV) metres
        3    line(s) of comment                                        1.000    Gradient (%)
        ***********************                                       60.000    Per cent Impervious
        FLOW D/S OF FIRST AVE CULVERT - OUTLET C                      68.000    Length (IMPERV)
        ***********************                                        .000    %Imp. with Zero Dpth
18      CONFLUENCE                                                        1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        1    Junction Node No.                                        .250    Manning "n"
                .433      7.881      .991      .000 c.m/s             74.000    SCS Curve No or C
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             .100    Ia/S Coefficient                                              .100    Ia/S Coefficient
            8.924    Initial Abstraction                                          8.924    Initial Abstraction
               1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                  .127      2.151      8.057      8.057 c.m/s                           .057      8.131       .221        .000 c.m/s
                  .367       .914       .695    C perv/imperv/total                     .367       .910       .422    C perv/imperv/total
15      ADD RUNOFF                                                        35      COMMENT
                  .127      2.246      8.057      8.057 c.m/s                3      line(s) of comment
27      HYDROGRAPH DISPLAY                                                         ***************************
        5       is # of Hyeto/Hydrograph chosen                                    FLOW U/S OF NIAGARA ST CULVERT - OUTLET D
        Volume = .8577177E+04 c.m                                                  ***************************
10      POND                                                             15      ADD RUNOFF
        5 Depth - Discharge - Volume sets                                              .057      8.188       .221        .000 c.m/s
         178.800      .000        .0                                      14      START
         179.300      .0260      1520.0                                          1      1=Zero; 2=Define
         180.100      .0440      4649.0
         180.600      .414       7069.0
         180.800     1.204       8137.0
        Peak Outflow    =      .250 c.m/s
        Maximum Depth   =   180.379 metres
        Maximum Storage =      5999. c.m
                  .127      2.246       .250      8.057 c.m/s
17      COMBINE
        1       Junction Node No.
                  .127      2.246       .250      8.089 c.m/s
14      START
        1       1=Zero; 2=Define
35      COMMENT
        3       line(s) of comment
        ***********
        PROP DEVELOPMENT SOUTH OF SEGMENT 3 - POND P31
        ***********
4       CATCHMENT
         33.000     ID No.ó 99999
         12.960     Area in hectares
        294.000     Length (PERV) metres
          1.000     Gradient (%)
         75.000     Per cent Impervious
        294.000     Length (IMPERV)
           .000     %Imp. with Zero Dpth
              1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .250     Manning "n"
         74.000     SCS Curve No or C
           .100     Ia/S Coefficient
          8.924     Initial Abstraction
              1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                 2.640       .000       .250      8.089 c.m/s
                  .368       .922       .783    C perv/imperv/total
15      ADD RUNOFF
                 2.640      2.640       .250      8.089 c.m/s
27      HYDROGRAPH DISPLAY
        5       is # of Hyeto/Hydrograph chosen
        Volume = .7430276E+04 c.m
4       CATCHMENT
         34.000     ID No.ó 99999
           .660     Area in hectares
         66.000     Length (PERV) metres
          1.000     Gradient (%)
         60.000     Per cent Impervious
         66.000     Length (IMPERV)
           .000     %Imp. with Zero Dpth
              1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .250     Manning "n"
         74.000     SCS Curve No or C
           .100     Ia/S Coefficient
          8.924     Initial Abstraction
              1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                  .122      2.640       .250      8.089 c.m/s
                  .367       .914       .695    C perv/imperv/total
15      ADD RUNOFF
                  .122      2.731       .250      8.089 c.m/s
27      HYDROGRAPH DISPLAY
        5       is # of Hyeto/Hydrograph chosen
        Volume = .7766209E+04 c.m
10      POND
        6 Depth - Discharge - Volume sets
         178.300      .000        .0
         178.900      .0350      1927.0
         179.600      .0540      4692.0
         179.800      .150       5590.0
         180.000      .321       6538.0
         180.300     1.922       8059.0
        Peak Outflow    =      .221 c.m/s
        Maximum Depth   =   179.883 metres
        Maximum Storage =      5982. c.m
                  .122      2.731       .221      8.089 c.m/s
17      COMBINE
        1       Junction Node No.
                  .122      2.731       .221      8.131 c.m/s
14      START
        1       1=Zero; 2=Define
18      CONFLUENCE
        1       Junction Node No.
                  .122      8.131       .221        .000 c.m/s
35      COMMENT
        3       line(s) of comment
        ***********************
        REALIGNED CHANNEL - SEGMENT 3
        ***********************
4       CATCHMENT
        302.000     ID No.ó 99999
          1.610     Area in hectares
        104.000     Length (PERV) metres
           .200     Gradient (%)
         10.000     Per cent Impervious
        104.000     Length (IMPERV)
           .000     %Imp. with Zero Dpth
              1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .250     Manning "n"
         74.000     SCS Curve No or C
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